THE IRON TRADE REVIEW

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Old Range Companies Will Close Many Mines

Rather Than Sell at Sacrifice—Considerable Irregularity in Finished Material Prices—Pig Iron Dull

Weather conditions still interfere with building operations and the delivery of products. There is much complaint of inadequate railroad service. Further softening of prices has characterized the finished material market in the east, and this is true to a lesser extent in some other parts of the country. On the whole, developments are not encouraging.

Pig Iron

For delivery in the south and other districts, the $10 quotation on No. 2 foundry pig iron seems to have disappeared, but on iron delivered in a few centers, $10 is still quoted. There has been some inquiry for southern iron for last half in the Chicago district, and $11 has been quoted. Inquiry for southern iron for export continues and from 4,000 to 5,000 tons are now pending for delivery at Genoa and Venice, Italy. There is also an inquiry for 1,000 tons for Australia. Recent sales of southern iron for export have been made at about $10, Birmingham. Throughout the country the pig iron market is very quiet, but prices show no inclination to sag.

Cast Iron Pipe

Public lettings of cast iron pipe are more numerous and private work is also active, but low prices are being made. The leading interest has taken 3,400 tons at Worcester, Mass., and 1,200 tons at Duluth. The average price on 24,000 tons, recently awarded in Chicago to the United States Cast Iron Pipe & Foundry Co., was $24.15 per ton, delivered.

Structural Material

Structural material prices show some irregularity, but erecting companies report many projects pending, and it is confidently expected that there will be improvement in demand as soon as the weather moderates. The Phoenix Bridge Works have furnished 2,000 tons to the fabricator of the Bing & Bing loft, New York City. The Newport News Ship Building Co. has been awarded two Pacific mail steamers, but the plain material has not been placed. The Carnegie Steel Co. has been awarded the plates and shapes for two coastwise vessels, requiring from 2,500 to 3,000 tons, to be built by the Toledo Ship Building Co. The Great Lakes Engineering Works, Detroit, has been awarded two coastwise vessels, but has not placed a contract for the plain material. The New York Ship Building Co. has taken contracts for two oil carriers for the Standard Oil Co., each of which will require 4,000 to 5,000 tons of steel. An eastern buyer is in the market for 2,500 tons of plates, 1,500 tons of shapes and 1,000 tons of sheets.

Railroad Buying

The Eastern Steel Co. will furnish 3,800 tons of plain material to the McClintic-Marshall Construction Co., for the Boston and Maine shops at Bellerica, Mass. The Pennsylvania railroad will build 1,900 cars at its Altoona shops this year and is placing contracts for some material for these cars. The New York Central has recently placed 1,750 tons additional for terminal work in New York City. The Illinois Central has purchased 15 carloads of bolts from the Continental Bolt & Iron Works, Chicago. It is officially announced that the Great Northern has awarded the Pennsylvania Steel Co. 15,000 tons of open-hearth rails, and the Maryland Steel Co., 5,000 tons of Bessemer rails. The Northern Pacific has divided 7,800 tons of rails between these two mills. The Pennsylvania Steel Co. has also taken 1,800 tons of girder rails for a Brooklyn railroad. The Chesapeake & Ohio railroad has ordered 25 mallett locomotives and 24 mikado locomotives from American Locomotive Co.

Iron Ore

With the exception of 50,000 tons of Bessemer ore sold at the price which prevails later in the season, no transactions in lake ore are reported. Some of the old range mining companies are taking a very decided stand against a reduction of more than 25 cents per ton this year and will sharply curtail production if a greater reduction is made. These companies prefer to allow their ore to lie in the mines rather than sell it at a sacrifice. The hope among eastern furnace men that they might be able to buy lake ore this season on a delivered basis competitive with local and foreign ores, appears to be passing. It is appreciated that eastern buyers could probably not get the benefit of a price sufficiently reduced to make lake ore attractive to them without their competitors in the Buffalo district profiting in a much larger way, which would be distinctly to the former's disadvantage. Several odd cargoes of Spanish ore have been offered and sold to eastern furnaces where charter arrangements had been made at prices ranging from 7 to 8 cents per unit, Philadelphia, according to grade. Spanish sellers, however, are avoiding making any contracts in view of trade conditions. Several lots of New York state ores have been sold lately at prices to be fixed later.

WORLD'S IRON MARKETS

Pittsburgh

Improvement in Tone—More Firmness in Some Lines.

Office of THE IRON TRADE REVIEW,
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An improvement in the general tone of the iron and steel market during the past week has been quite distinct, and at points where a week ago there appeared to be a tendency toward softening of prices, there has developed more firmness and less anxiety on the part of manufacturers to force business. Consumers of leading lines of steel have increased liberally on specifications, and are apparently taking more advantage of the lower prices which the manufacturers have been restricting more determinedly as the spring season approaches. A severe shortage of cars for mill service has developed, that, unless relieved soon, will likely force a suspension of operations in some of the mills of the Pittsburgh district. The same difficulty is appearing in the coke regions and has tied up shipments. Pig iron, while not so depressed, still lacks much new life. There is a heavy shipment on contract obligations in all grades, with the exception of Bessemer iron, and inquiries are appearing for this grade as well as for malleable, owing to better conditions in the steel and malleable casting lines. Basic iron has sold a little more freely. Plate manufacturers have shown a firmer attitude in accepting new business, some of the larger producers holding to the nominal quotation of 1.15c and declining to consider concessions offered last week under some conditions. Freer specifications have come to these mills, and a sharp gain in eastern buying is reported. Sheet and tin plate production is maintained on a full mill schedule except where interfered with by shortage of cars or of raw material supply. Railroads are specifying more freely on their rail requirements and the light rail trade has continued its upward trend in new business. The semi-finished steel market is showing greater strength than for some time and with this improvement, at least in Pittsburgh territory, there has appeared a more pronounced differential between Bessemer and open-hearth steel with the larger producers sold up for some time ahead on open-hearth rolling billets and sheet bars. Merchant steel bars are more active in demand and structural steel buyers are taking more liberally on required tonnage, with a better price attitude by the makers. Merchant pipe is active and strong, with line pipe holding its own. Wire products are making a record production and mills are cleaning up on the orders taken on the old list prices. Coke conditions tend toward a much stronger market in the immediate future, increased demand for furnace and foundry grades being reported and prices becoming more firm. The market for old material has remained dull and little is being done in the way of replenishing stocks by consumers.

Pig Iron.—Some fairly large sales of basic and foundry pig iron during the past week have given a fair test to the present market quotation, and have developed a stubborn resistance on the part of the furnace men by refusing further recessions in prices. A sale of basic pig iron varying from 10,000 to 12,000 tons, was closed last Friday, for delivery in the Monongahela valley, the order going to a non-valley furnace. This sale was made for March delivery. Small sales of basic are commanding $12.40 to $12.50, valley, and while some sales are reported on as low a base as $12.25, they lack confirmation. No. 2 foundry is moving in carload lots and above 100 tons at a time at $13.25, valley, and especially attractive business is being done at $13. The vast improvement developing in the malleable casting trade, has awakened a slightly greater interest in malleable pig iron, and more inquiries are reported as a result. The market is fairly firm at $13, valley. Some of the malleable casting plants report new business booked during the past ten days, to keep them well supplied with orders for the next two or three months. A similar improvement is noted in the steel casting trade, the gain in volume being greater, and opening to some extent the demand for Bessemer. This, however, has not as yet been felt among the furnaces, and Bessemer sales are still at a minimum with a market demanding nominally $14 to $14.25, valley. There has been no increase in production, and the leading interest is maintaining 52 active out of 59 blast furnaces, with three stacks operating on manganese. Within the next three weeks, from four to six blast furnaces outside the Pittsburgh district will blow in, calling for between 54,000 and 60,000 tons of furnace coke a month from the Connellsville region. We quote the market as follows:

(Prompt Shipment.)

Bessemer, valley	$14.00
Bessemer, Pittsburgh	15.15
Basic, valley	12.40
Basic, Pittsburgh	13.30
No. 2 foundry, Pittsburgh	14.15
Gray forge, Pittsburgh	13.40
Malleable, Pittsburgh	13.90

(First Quarter.)

Bessemer, valley	$14.00
Bessemer, Pittsburgh	15.15
Basic, valley	12.40
Basic, Pittsburgh	13.30
No. 2 foundry, Pittsburgh	14.15
Gray forge, Pittsburgh	13.40
Malleable, Pittsburgh	13.90

Ferro-Alloys.—Sales in car-load lots in ferro-manganese are a little more numerous than a week ago, and prices are firm at $41. Fifty per cent ferro-silicon in small sales is very firm at $70, and there is a slight increase in inquiries. While domestic 10 per cent is dull, such business as is going, however, is taken at satisfactory prices.

We quote ferro-manganese nominally at $41, Baltimore, for prompt and forward delivery. The freight rate from Baltimore to Pittsburgh is $1.95 per ton.

Fifty per cent ferro-silicon is quoted nominally at $70, Pittsburgh, for prompt and forward delivery; 12 per cent, $22; 11 per cent, $21; 10 per cent, $20, f. o. b. Globe, Jisco and Ashland furnaces. The freight rate to Pittsburgh is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—The production of plates has been large, and new business has been more active during the past week. The improvement has been felt by all the large plate companies, and prices have shown a tendency to stiffen materially. While there is some business being done at 1.10c base for eastern buyers, this business has grown less, and Pittsburgh, Youngstown and Central Pennsylvania mills are holding out more firmly for 1.15c base for plates, and have declined some fairly good business tendered at less. The car market has

been quiet. The orders expected from the Western Maryland railroad for 2,750 cars, and from the Bessemer & Lake Erie for 2,000 cars, have not appeared yet, but it is announced that another week will probably settle this business. There are inquiries pending for some fairly large contracts for steel freight cars by important trunk lines, that are expecting to supplement their existing order somewhat extensively. The demand for ship plates is much more active, considerable tonnage having been placed, and much more, now in the form of inquiries from ship-building yards, is being figured on by the mills. On existing contracts, specifications are quite heavy, the larger producers being booked up for the next 60 days, and not in position to assume additional obligations for deliveries, unless under very urgent orders. We quote the market as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.10 to 1.15c. Extras are as follows, per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end being not less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½ inch to and including $\frac{7}{16}$-inch plate on thin edge, 0.10c; under $\frac{7}{16}$ and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—A feature of the sheet market for the past week, has been a great scarcity of cars for shipments from mills, which has become so acute, that some of the plants are likely to be forced to a temporary suspension of operations, unless relief comes soon. Similar difficulty is met in the shipment of sheet bars to the mills, which is curtailing the raw material supply somewhat shortly. Specifications against existing contracts are still quite sufficient to maintain a good schedule of operation at the mills, but new business is not coming out to any extent, and some of the independent manufacturers are quoting 1.85c for new business, and in some cases, it is believed that 1.80c has been done for No. 28 gage black sheets, but this is not a general condition and insufficient in size to make the market. Galvanized sheets are firm at 2.85c to 2.90c, the former price being a concession for very desirable business. The demand for roofing sheets is more quiet, due to the severe weather conditions, which has temporarily stifled all out door work. We quote the market as follows:

Blue annealed sheets No. 10 gage, 1.40c; black annealed sheets No. 28 gage, 1.85 to 1.90c; galvanized sheets, No. 28 gage, 2.85 to 2.90c; painted roofing sheets, $1.35 per square for No. 28 gage, 2½-inch corrugation; galvanized roofing sheets, $2.45 per square for No. 28 gage, 2½-inch corrugation, f. o. b. Pittsburgh.

Tin Plate.—The market for tin plate is continuing at a fair rate of demand, consumers specifying quite liberally on contracts, and there is also reported a fair run of small orders in the new bookings, with prices firm, and shipments are as steady as could be expected with the shortage in cars, both for finished material, and in getting in raw material for the mills. Some independents are still in the market for orders at the lower quotation of $3.35, but the leading interest and most of the large producers, report being well filled up with business, and are not offering any inducements for new tonnage below the $3.40 base. The Standard Oil Co. has placed an order for approximately 100,000 boxes of tin plate during the past week with one of the large independent manufacturers with plants in Ohio and West Virginia. The price is not given, but is believed to have been at a considerable concession from the existing market. This order represents about one-third to one-fifth of the anticipated tonnage of this buyer for its year's requirements. We quote the market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.35 to $3.40 f. o. b. mill, Pittsburgh district.

Rails and Track Material.—Railroads that have placed their contracts for their year's supply of rails, are commencing to specify more freely for their allotment. While a fair amount of small orders continue to come to the mills, in the aggregate, they keep the rail mills fairly well supplied with business and in the Pittsburgh district, operations have shown some gain in volume of output. There is considerable new tonnage pending both for domestic and foreign shipment, and the light rail demand, which has been steadily increasing for the past two weeks, has filled the order books of the leading producers, and shipments are on a heavier basis than for several months past. Important new business during the last week to reach the mills has not been large. One order of between 12,000 to 13,000 tons for the Norfolk & Western railroad, has been one of the last additions to the tonnage books. The demand for track material is still backward, owing to the season being somewhat early for the placing of contracts for this part of the railroad requirements for the year, but prices are quite firm, and inquiries indicate an early awakening of activity in this branch of the rail industry. There is, however, a fair run of orders, and shipments are increasing slightly from the mills. The market is quoted as follows, and the base price on open-hearth steel rails 1.34c per pound at the mill.

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.16c, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburgh; track bolts, 2.20c to 2.25c, Pittsburgh.

Railroad Spikes.

4½, 5 and 5½ and 9-16	$1.40
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x $\frac{7}{16}$	.20
3, 3½, 4 and 4½ x ⅜	.30
2½ x ⅜	.40
2½, 3 and 3½ x $\frac{7}{16}$	.60
2 x $\frac{7}{16}$	.80

Steel.—The market for semi-finished steel is in a stronger position than it has been for some months. There has been an increasing demand for open-hearth rolling billets, and the larger producers are so well sold up that they are practically out of the market for the next month and, in some cases, two months. Bessemer rolling billets, while not so active, are held firm at $20, Pittsburgh, and the best price quoted from Youngstown is $19.50 mill, making this source of supply for Pittsburgh, 50 cents above the nominal quotation, by the addition of the usual freight rate. Open hearth sheet bars are in heavy demand, and producers are declining tenders of fair sized tonnages for prompt shipment at $21.25, Pittsburgh, while $21.50, Pittsburgh, has been done during the past week on urgent business. There has been a determined effort on the part of the buyers to find a weak spot in the open-hearth sheet bar market, but even higher than $21.50 has been demanded on prompt shipment. The sale, however, was not made. Bessemer sheet bars are quoted $20, Youngstown, which, with the freight rate, would mean $21, Pittsburgh. The tender of a fair amount of tonnage at $20.50, Youngstown, for delivery in Pittsburgh, was accepted during the past week with provisions for prompt shipment. Consumers are specifying heavily against contracts placed at the first of the year, and are seeking to increase their contract deliveries, but most mills report delays in shipments and are having dif-

ficulty in meeting the requirements of the buyers promptly. The demand for forging billets is very active. The leading interest is unable to accept any current business, and the independent producers are getting $28, Pittsburgh, for all tonnage accepted by them. The difference between open-hearth and Bessemer rolling billets is becoming more marked, and Youngstown producers are declining more regularly to meet Pittsburgh quotations by shading the difference in freight rates on their prices. We quote the market as follows:

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $20, with the usual extras for size and analysis, and open-hearth rolling billets, $20 to $20.50; Bessemer sheet and tin bars are quoted at $21, and open-hearth sheet bars are quoted at $12.75 f. o. b. Pittsburgh, with full freight to destination added. Forging billets are quoted at $28, Pittsburgh.

Hoops and Bands.—Very fair specifications against existing orders for hoops and bands, and February shipments are maintaining their lead over the first month of the year. There is no change in prices, producers not being disposed to go strongly into the market at this time. We quote the market as follows:

Hoops in carload lots, 1.25c to 1.30c, Pittsburgh; in less than carload lots, 1.40c; bands, 1.15c, base, with net extras, as per standard steel.

Merchant Bars.—Merchant bars are somewhat more quiet, although the producers are fairly well supplied with orders for a few weeks ahead. The weakness in the eastern demand is becoming more of a feature in eastern mills obtaining new business, and the lower price of 1.10c, Pittsburgh, ruled more freely during the past week, though it is confined to the more atttractive class of orders, and generally new business in Pittsburgh is still being done at 1.15c, the nominal market quotation. Eastern mills are making lower prices for consumers in their own territory, by dividing their freight advantage with the buyer. There is little change in the shafting market, and shipments on contracts are somewhat below the expectation of the manufacturers. New business is falling off to some extent, though inquiries are slightly improved during the past week. Prices, however, remain unchanged. Iron bars show a softening tendency, and while the price nominally remains at 1.35c, Pittsburgh, desirable business can be done at 1.30c, Pittsburgh. The mills report some tonnage coming out on this lower basis. We quote the market as follows:

Common iron bars, 1.30c to 1.35c, Pittsburg; Bessemer and open-hearth steel bars, 1.10 to 1.15c; plow and cultivator, 1.25c; channels, angles, zees, tees, under 3 inch, 1.25c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds of a size, 0.35 advance. Cold rolled and ground shafting, 65 per cent off in carloads and 60 and 10 per cent in less than carloads, delivered in base territory.

Muck Bar.—There is very little change in the market for muck bar. A fair amount of specifications is coming in against existing contracts, but new business is quiet, and consumers have apparently protected themselves in the matter of immediate requirements, and are not showing a disposition as yet, to enter the market for additional tonnage. Prices remain nominally $28 to $29, Pittsburgh.

Structural.—Structural steel is being somewhat more freely taken by large consumers, who are specifying regularly on contracts, and mills are enabled to maintain a steadier production. While there is still a tendency to shade prices, on attractive orders, the larger mills are holding more firmly to 1.15c base, and will not consider new orders at anything lower unless under very special conditions. Contracts awarded during the past week were confined to small lots, and while these individually represented no great amount of business, they amounted, in the aggregate, to a very good tonnage. The loosening up of weather conditions has encouraged a more free specifying of orders on bridge and building material, and these are coming in to the mills more heavily than was expected. We quote the market as follows:

Beams and channels, 15 inches and under, zees, 1.15c; tees, 1.15c; angles, from 3 to 6 inches, 1.15c; over 6 inches, 1.25c; universal and sheared 1.15c to 1.20c; over 15 inches, 1.25c to 1.30c, plates, 6¼ inches wide and wider, 1.25c.

Merchant Pipe.—Demand for merchant pipe is maintaining a very strong tone, a good run of small orders being taken on current prices, while the pipe mills are operating on a better schedule than at any time since 1907. The aggregate of small tonnage placed the past week represented a larger total than at any time during the present year. One important inquiry now in the hands of the manufacturers of steel line pipe is for 60 miles of 12-inch, for Ohio delivery, and is being figured on for one of the large Pittsburgh gas companies. Aside from this inquiry, the principal trade in line pipe is in small lots, from carloads to two and three miles of varying sizes. There was a temporary slowing up of specifications for line pipe during the past week, due mainly to the frozen-up condition of the country, and necessary suspensions of out-of-door operations. We quote the official discount to jobbers, subject to the usual preferential discount to the larger buyers:

Iron and Steel Pipe Basing Prices

	Steel.		Iron.	
	Butt weld.			
	Black.	Galv.	Black.	Galv.
⅛, ¼ inch	74	54	68	48
⅜ inch	75	65	69	59
½ inch	78	68	72	62
¾ to 1½ inch.....	81	73	75	67
2 to 3 inches.....	82	75	76	69
	Lap weld.			
2 inches	79	72	72	65
2½ to 4 inches.....	81	74	74	67
4½ to 6 inches....	80	72	73	65
7 to 12 inches.....	77	68	71	61
13 to 15 inches.....	55	..	47	..
Extra Strong, Plain Ends.				
	Butt weld.			
⅜, ¼, ⅛ inch.....	70	60	65	55
½ inch	75	69	70	64
¾ to 1½ inch.....	79	73	74	68
2 to 3 inches	80	74	75	69
Extra Strong, Plain Ends.				
	Lap weld.			
2 inches	76	70	71	65
2½ to 4 inches.....	81	74	74	67
4½ to 6 inches.....	77	71	72	66
7 to 8 inches.....	70	60	65	55
9 to 12 inches.....	65	55	60	50
Double Extra Strong, Plain Ends.				
	Butt weld.			
½ inch	65	59	60	54
¾ to 1½ inch.....	68	62	63	57
2 to 3 inches	70	64	65	59
Double Extra Strong, Plain Ends.				
	Lap weld.			
2 inches	66	60	61	55
2½ to 4 inches.....	68	62	63	57
4½ to 6 inches.....	67	61	62	56
7 to 8 inches.....	60	50	55	45

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

The above discounts are for full weight pipe, subject to a variation of 5 per cent, merchant pipe, when specified, being furnished up to 6 inches at one point higher discount (lower price.)

Boiler Tubes. — Specifications are slightly better against contracts for iron and steel boiler tubes, and mills are able to maintain a better running schedule than they were a week ago. Prices are firm, and indications of an improved buying movement, which has become quite apparent in the galvanized tube demand. The official discount on steel and charcoal iron boiler tubes follows:

Steel:

1¾ to 2¼ inch.....	65
2½ inch	67½
2¾ to 3¼ inch.....	72
3½ to 4½ inch.....	75
5 and 6 inch.....	67½
7 to 13 inch.....	65

Charcoal Iron:

1½ inch	48
1¾ to 2¼ inch.....	50
2½ inch	55
2¾ to 5 inch	60

To destination east of Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire Products.—Any change in the specifying against contracts for wire and wire nails, has been for the better during the past week. Generally, producers are making a record run, and expect to continue the present rate through February, as this month will finish up business on the old basis of $1.50, Pitts-

burgh. New business is not large, although producers are maintaining quite firmly the price of $1.60, and show no disposition to change front. Large shipments are being made steadily, while much of the present production is believed to be going into supply stocks at warehouses. We quote the market as follows.

Wire nails, jobbers, carload lots, $1.60; retailers' carload lots, $1.65; cut nails (western makers), jobbers' carload lots, $1.55 to $1.60, painted barb wire, jobbers' carload lots, $1.60; retailers' carload lots, $1.65 with 30c for galvanizing; plain wire to jobbers in carloads, $1.40; and to dealers, in carloads, $1.45; polished staples, $1.60; galvanized staples, $1.90.

Wire Rods.—The demand for wire rods against existing contracts is heavy. There has been some additional inquiry and prices are firm, with the leading producers not seeking new tonnage for forward delivery below $26. We continue to quote, however, $25.50 to $26, Pittsburgh, for Bessemer and open-hearth wire rods.

Coke.—Foundry coke demand has shown a marked improvement, and most of the leading producers are behind on contract deliveries, due to the cold weather, which has been rendered more acute by reason of the scarcity of suitable cars for these shipments. Prices are much firmer, good sales having been made this week on standard Connellsville foundry at $2.50, ovens, while some contracts have been taken for the second quarter at $2.40, ovens. Spot furnace coke has improved in demand, and while some reports indicating a further weakness in price were heard, they lacked confirmation. From four and six additional blast furnaces that depend on the Connellsville region for coke supply to be blown in within the next three weeks, will require between 54,000 and 60,000 tons a month. This is expected to absorb all possible increase in production. In addition to this condition, the pending strike in the bituminous and also in the anthracite region promises to seriously interfere with the production, and while it is possible to secure spot furnace coke at $1.80 to $1.85, the large producers are showing a disposition to hold off on such business, and many refuse to consider any tenders of less than $1.90, ovens. The production of coke for the last week showed a falling off by 5,584 tons, as compared with the week before. We quote standard Connellsville furnace coke for prompt shipment $1.80 to $1.90, ovens, and high grade Connellsville foundry coke $2.25 to $2.50, ovens, for prompt shipment, and from $2.25 to $2.40, ovens, for contract shipment. The Connellsville *Courier* for the week ending Feb. 10 reports 30,434 ovens active, with a production of 354,569 tons, as compared with 30,487 ovens with a production of 360,153 tons for the previous week.

Old Material.—There has been little change in the market for scrap, and prices remain at a low level, though nominally they are unchanged from a week ago. Dealers report a little more activity in the selling end of the market, the open weather encouraging a disposition to get out from under the snow, the piles of ice-covered material of the past few weeks. Inquiries are few, and interest in the market seems to be extremely low. We quote gross tons, delivered in Pittsburgh district, including Monessen, Steubenville, Brackenridge and Follansbee, as follows:

Heavy melting scrap	$12.25 to 12.75
Rerolling rails	12.75 to 13.00
Malleable	12.00 to 12.50
Bundled, sheet scrap	10.50 to 11.00
Iron axles	21.50 to 22.00
Old iron rails	15.00 to 15.50
Stove plate	9.00 to 9.50
No. 1 wrought scrap	12.50 to 13.00
Old car wheels	12.50 to 13.00
Low phosphorus	15.00 to 15.50
Machine shop turnings	9.25 to 9.75
Cast borings	9.00 to 9.25
No. 1 cast scrap	12.50 to 12.75

Cincinnati

Pig Iron Prices Stronger, But Sales are Few and of Small Tonnages.

Office of THE IRON TRADE REVIEW, 503 Mercantile Library Bldg., Feb. 20.

Pig Iron.—While the market here is showing a stronger tendency each day to rise above $10, Birmingham, for No. 2 foundry, it does not seem to have fully reached that stage as yet, and there is still some iron being offered in the south on this basis. It is rather hard to judge the market at present, as the inquiries and sales are so few and so small that they do not afford anything upon which to base either present or future developments. Business, though, cannot be said to be slow, as most furnaces report favorable shipments, and melters are continually asking for faster deliveries, which shows that they are using the iron at a satisfactory rate.

Another good sign is the fact that, while for a long time sales have been restricted practically to territories tributary to the furnaces, they are now being made more in competition with northern and eastern sellers than for some time past. Stocks in furnace yards are not being enlarged and in most cases they are being reduced. As has been the case for some time, railroads are still unable in most instances to deliver the iron on scheduled time and as a result some users are being seriously handicapped and will buy in carload lots for prompt shipment whenever the iron can be obtained. The majority of dealers here are still holding for $10.50, Birmingham, for No. 2 foundry, and some are making a $10.25, Birmingham, price, but there still seems to be a little left in the Birmingham district for $10, although there is no doubt that it is disappearing. In some of the other producing districts in the south, however, there is still iron to be had on a $10, Birmingham, basis. The seven months just past during which the $10 price has prevailed is probably a record as to the time that pig iron has remained at such a low figure. The northern situation is on a firmer basis than the southern, and the market is still rather firm at $13, Ironton, for northern No. 2 foundry. There is a disinclination among dealers here to consider business beyond the first half, and although some inquiries recently reported call for deliveries into the second half, they are not being quoted upon to any extent.

Inquiries here are very scarce, and are mostly for small lots for prompt shipment. The only one of any importance reported calls for 1,000 tons of low phosphorus iron for shipment into Michigan, probably during the first half. Sales, which are very few and for small tonnages, include 750 tons of southern No. 4 foundry for shipment during February and March, and 200 tons of charcoal iron, which went to a southern Ohio melter for first quarter delivery. Freight rates from Birmingham, $3.25, and from Ironton, $1.20. We quote Cincinnati prices as follows:

Southern foundry No. 2	$13.25 to 13.75
Southern foundry No. 3	12.75 to 13.25
Southern foundry No. 4	12.50 to 12.75
Southern gray forge	12.50 to 12.75
Mottled	12.25 to 12.50
Southern No. 1 soft	13.75 to 14.25
Southern No. 2 soft	13.25 to 13.75
Standard southern car wheel	25.25 to 25.50
Northern No. 2 foundry	14.20
Northern No. 3 foundry	13.70
Northern No. 4 foundry	13.45 to 13.70
Jackson co. 8 per cent silicon	16.45 to 16.95

Coke.—Some sales of Connellsville furnace coke have been made at $1.75 and the market price seems to have dropped to that figure for prompt shipment. For contract, $1.85 is still being asked. Some inferior grades of Connellsville foundry coke can be had at $2, but the prevailing price is firm at $2.25 to $2.40 for first class product for both prompt delivery and contract, and sales are being made mostly on this basis. A sale of 50 cars of foundry coke was made this week and there is an inquiry pending for 10,000 tons of furnace coke to be shipped this year. Curtailment of output is still the main feature, and shipments,

as a general rule, are very much delayed. Prices in the Wise county district are firm and are also unchanged in both the Pocahontas and New River districts. We quote from the leading coke producing districts as follows:

	Prompt. shipment.	Contract second half.
Connellsville district.		
Foundry coke	$2.25 to 2.40	$2.25 to 2.40
Furnace coke	1.75 to 1.80	1.85 to 2.00
Wise county district:		
Foundry coke	$2.00 to 2.25	$2.00 to 2.25
Furnace coke	1.75 to 2.00	*Sliding [scale basis.
Pocahontas district:		
Foundry coke	$2.00 to 2.10	$2.00 to 2.10
Furnace coke	1.65 to 1.75	1.70 to 1.90
New river:		
Foundry coke	$2.50 to 3.15	$2.60 to 3.25
Furnace coke	2.00 to 2.10	2.10 to 2.20

*Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16⅔ per cent of the amount over $9 which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.

Finished Material.—While steel bars are still 1.15c, Pittsburgh, they are not as firm as they were last week. Other prices can be quoted without change. Nothing new has developed during the past week regarding the structural items pending here, including the two new hotels and the proposed Union station. The contracts for the annex to the Sinton hotel have been let. H. Harig & Co., Cincinnati, have the general contract, and the steel, which included in all about 300 tons, was given to the Ahrens Iron Works. The Hess Spring & Axle Co., Carthage, has recently purchased a large assortment of machinery equipment, including a number of machine tools, for installation in its new plant now being built. The company is also reported to be in the market for more equipment. The Eagle White Lead Works, Cincinnati, the plant of which was recently badly damaged by fire, is rebuilding as fast as possible, and no delay in shipments will be necessitated. We quote Pittsburgh mill prices for finished materials mostly sold in Cincinnati, as follows:

MILL PRICES.

Steel bars, 1.15c; iron bars, 1.35c; tank plates, 1.15c; black sheets, No. 28 gage, 1.90c; galvanized sheets, No. 28, 2.90c; sheet, blue annealed, No. 10, 1.40c; structurals, 1.15c, all Pittsburgh basis.

Aside from twisted concrete reinforcing bars, the warehouse business here is quiet and prices are firm. The sudden moderation of the weather makes it possible for contractors to go ahead with building projects, and as a result they occasionally need good supplies, particularly concrete bars. The machine tool builders are also occasionally coming to the warehouses for quick supplies of steel. Sales are mostly being made in small lots. We quote warehouse prices, f. o. b. Cincinnati, as follows:

WARE HOUSE PRICES.

Steel bars, 1.60c base; iron bars, 1.55c to 1.60c base; structurals, 1.70c base; plates, ¼ inch and over, 1.70c base; sheets, blue annealed, No. 10, 1.90c base; rivets, cone head, 2.25 base; cold rolled shafting, 60% discount; boiler tubes as follows: 1¾ to 2¼ inch, 61 per cent discount; 2½ inch, 63 per cent discount; 2¾ to 3¼ inch, 66 per cent discount; 3½ to 4½ inch, 68 per cent discount; and 5 to 6-inch, 61 per cent discount; and soft steel cold twisted concrete bars, cut to length as follows: ¾ inch square and larger, 1.70c; ⅝ inch square and larger, 1.80c; ½ inch square and larger, 1.90c; ⅞ to ¾ inch square and larger, 2.10c; ¼ inch square and larger, 2.20c to 2.30c.

Old Material.—The scrap iron market is practically at a standstill. Some dealers report a weakening in prices, but as a whole the majority maintain that they are unchanged. The moderation of the weather has not as yet brought the looked-for betterment of business, but it is thought that as soon as the railroads can ship supplies to the foundries here at a faster rate, the demand for scrap will increase. Buying and selling is still done mostly in small lots. A recent sale of rerolling steel rails brought $13, which included the freight to Cleveland. Demand for materials in general is for prompt delivery. According to a summation of dealers' quotations, prices are as follows:

GROSS TONS.

Old iron rails	$12.00 to 13.00
Old steel rerolling	11.00 to 11.50
Old iron axles	18.00 to 18.50
Steel melting scrap	9.50 to 10.50
Car wheels	10.50 to 11.00

NET TONS.

Old No. 1 R. R. wrought	$10.50 to 11.50
No. 1 machinery	10.00 to 10.50
No. 1 busheling	8.00 to 9.00
Stove plate	6.50 to 7.00
Machine shop turnings	5.50 to 6.00
Cast borings	4.50 to 5.00
Grate bars	6.00 to 7.00
Sheet iron, bundled	6.50 to 7.50
No. 1 cast scrap	10.00 to 10.50
Heavy turnings	6.00 to 7.00

Philadelphia

Much Shading in Finished Lines—Iron Sales Light.

Feb. 19.

Market conditions in the eastern district show slow improvement and in some respects are less favorable. Price cutting is working its way along the entire line of finished products, with some exceptions, and the shading runs from $1 to $2 a ton. Improvement in volume is anticipated with the break in weather conditions. New business in pig iron is small, but consumers are taking iron freely against contracts. Some fair lots of steel scrap have been sold to one eastern consumer, but this market is dull, as a whole.

Pig Iron.—Eastern Pennsylvania furnaces are shipping actively on contract, but the quietness in new business shows no abatement. Several makers report they are shipping metal at a rate exceeding their output. The Bethlehem Steel Co. has blown in its furnace E and now has all six of its furnaces in blast, though one may go out soon. This interest continues a most active seller of merchant iron in the east. Cast iron pipe companies in the Delaware river district are more actively sounding the market, though they have put out no formal inquiries and will probably take in a round tonnage soon to cover pipe contracts recently taken in eastern territory. The Lynchburg, Va., pipe foundries have closed for several thousand tons of No. 3 additional from Virginia makers at full prices of $12.25, furnace, or about $13, delivered. The regular foundry trade is very quiet and prices show no changes. An eastern Pennsylvania iron mill has bought 500 tons of standard forge for March-April shipment, at prevailing prices. Southern iron continues to strengthen and sellers report No. 2 grade is now not available under $10.25, Birmingham. Small sales at $10.50, Birmingham, in this territory are noted. The receivers of the Central Iron & Steel Co. continue to negotiate for 2,000 tons of basic, but otherwise there is no interest in this grade, which is quotable at $14.25, delivered in eastern Pennsylvania. Sales of about 900 tons of standard low phosphorus iron, including one lot of 500 tons, are noted at the equivalent of $19 to $19.25, Philadelphia. A steel maker in this territory is still inquiring for 5,000 tons of this grade for second quarter.

We quote for prompt and second quarter shipment, at Philadelphia or vicinity, as follows, with switching and handling charges from docks included, for Virginia and southern iron:

No. 1X foundry	$15.25 to 15.50
No. 2X foundry	14.75 to 15.25
No. 2 plain	14.50 to 14.75
Standard gray forge	14.00 to 14.25
Basic	14.25
No. 2X Virginia	15.50 to 15.75
No. 2 southern	14.50 to 15.00
Standard low phosphorus	19.00 to 19.25

Finished Material.—Much unevenness in finished prices continues apparent, and the general effect is to indicate an increased softening of conditions. Practically all lines are coming in for their share of irregularity with the exception of rails, nails and wire and semi-finished steel. Some increases in the volume of business entered are reported, but these do not apply generally. Eastern operations

continue from 55 to 60 per cent of steel capacity.

Attractive lots of shapes are bringing out quotations of 1.10c, Pittsburgh, or 1.25c, Philadelphia, and there are well-defined reports that this level is being undersold. Some eastern makers are quite aggressive for tonnage, but the unstability of prices cannot be limited to any one section. Buyers are reporting more looseness in plate quotations. Steel bars range from 1.10c to 1.15c, Pittsburgh, and bar iron from 1.15c to 1.20c, eastern mill. In sheets, No. 10 gage blue annealed is offered in the east by Pittsburgh district makers at 1.35c, Pittsburgh, but eastern makers are holding firmly at 1.40c, Pittsburgh. Some sales of tin plate have been made in the east recently at $3.30, Pittsburgh, or $2, shading. One buyer took 13,000 boxes. Rerolling billets are firm at $20, Pittsburgh, sales of about 1,000 tons being noted at this level. On forging steel, a leading eastern mill continues to quote $25, Pittsburgh.

Structural lettings include 600 tons to the American Bridge Co. for the Home for the Indigent, this city. Plans are out for the Vendig hotel, this city, 600 to 700 tons, to close March 2. An office building for Columbia, S. C., originally calling for 1,000 tons, is being revised. Bids closed within the week for a foundry for the Washington navy yard, to require about 1,000 tons. Bids go in Feb. 23 on a quantity of 24-inch beams and other supplies for Panama. The Standard Oil Co. is figuring on considerable boiler work to require about 1,000 tons of plates. The Pennsylvania railroad has placed some additional orders for plates and shapes with eastern and Pittsburgh mills for car construction at Altoona. An eastern buyer is in the market for 2,500 tons of plates, 1,500 tons of shapes and 1,000 tons of sheets.

We quote, delivered at Philadelphia and vicinity, as follows:

Structural shapes, 1.25c to 1.30c; steel plates, 1.25c to 1.30c; steel bars, 1.25c to 1.30c; common bar iron, 1.22c to 1.25c; cut nails, 1.65c to 1.70c; blue annealed sheets, No. 10 gage, 1.50c to 1.55c; 4 x 4-inch open-hearth rolling billets, $22.40 to $23.40; forging billets, $26.40 to $27.40. Extras shown under Pittsburgh report.

Ship Building Work.—The New York Ship Building Co. recently received the contract for two oil carriers for the Standard Oil Co., which will be of heavy construction and will require from 4,000 to 5,000 tons of shapes and plates each. This tonnage will go to Pittsburgh mills. The yards of the Harling & Hollingsworth Corporation, Wilmington, Del., are well filled with work for several years. Other boat builders continue to report unusually heavy estimating work. The large steamships of the Southern Pacific railroad interests are still pending. Marine boiler building is active and eastern plate mills are receiving liberal specifications from that source.

Coke.—An eastern steel company this week bought 50 cars of furnace coke for quick shipment at $1.75, ovens. The range of the market, as quoted to eastern buyers, is $1.75 to $1.80, ovens, for prompt shipment, with higher asked on contracts.

Old Material.—An eastern steel works has recently closed through a middleman for 4,000 to 5,000 tons of heavy steel at $12, delivered, without commission. This is the only sizeable sale that has been made in the east for some time. The general eastern Pennsylvania market for first quality steel may be quoted at $12, with yard material going at lower prices. Borings are a trifle stronger, due to a temporary scarcity. The buyers' market that has recently ruled continues without much modification. Sales are light and prices show no hardening tendency.

We quote, gross tons, delivered in eastern Pennsylvania and New Jersey consuming territory, as follows:

Old iron rails	$15.75 to 16.25
Old steel rails (rerolling)	13.50 to 14.00
No. 1 heavy melting steel	11.75 to 12.25
Old car wheels	12.00 to 12.50
Old iron axles	22.00 to 23.00
Old steel axles	17.00 to 17.50
No. 1 railroad wrought	14.25 to 14.75
Wrought pipe	11.50 to 12.00
Cast borings	8.25 to 8.75
Machine shop turnings	8.75 to 9.25
Heavy cast	12.50 to 13.00
Malleable	11.50 to 12.00
Stove plate	10.00 to 10.25

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg and Steelton, Pa.; $1.40 to Milton, Pa.

St. Louis

Very Few Sales of Pig Iron—Structural Business Pending.

Feb. 17.

Pig Iron.—Sales of pig iron in car lots, and very few of them, characterized the pig iron market in the St. Louis territory last week, and inquiries out this morning do not give a suspicion that conditions will improve any during the present week. Southern iron, No. 2, is still quoted at from $10 to $10.50, Birmingham basis, but it is generally conceded that no difficulty is experienced in obtaining iron at the lower figure.

Our tabulated prices, delivered, to which the Birmingham freight of $3.75 has been added, follow:

Southern No. 1	$14.50 to 14.75
Southern No. 2	14.00 to 14.25
Southern No. 3	13.50 to 13.75
Southern No. 4	13.00 to 13.50

Coke.—Trading in coke is keeping pace with the dullness in the pig iron market, with prices remaining as follows:

We quote 72-hour Connellsville foundry grades, $2.15 to $2.40 for first half of 1912; 72-hour foundry, $2.15 to $2.25 on tracks and for immediate delivery; 48-hour Connellsville furnace, $1.75 to $1.80; best 72-hour Virginia foundry, $2.15 to $2.25; 48-hour Virginia furnace, $1.75 to $1.85. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Finished Material.—Although the orders have not been placed, some of the railroads are reported to be in the market for quite a number of steel cars, and the St. Louis-Southwestern Railroad Co. has let a contract for two bridge spans, calling for about 250 tons. Inquiries are out also for quite a tonnage of transmission poles, power plant and other steel work in connection with the dam at Keokuk, Ia. Competition is keen to secure the contract for ornamental iron to be used in the Railway Exchange building, as well as for quite a lot of reinforcing bars for use in the same structure.

Old Material.—Trading is at a standstill in scrap iron, with no signs of improvement. Our quotations remain as follows:

GROSS TONS.

Old car wheels	$13.00 to 13.50
Old iron rails	14.00 to 14.50
Re-rolling rails (5 feet and over)	12.00 to 12.50
Old steel rails (3 feet and under)	10.75 to 11.25
Light section relayers (45 lb. and under) subject to inspec..	20.00 to 21.00
Re-laying rails, subject to inspec.	23.50 to 24.00
Frogs, switches and guards	10.00 to 10.50
Heavy melting steel	10.50 to 11.00
Shoveling steel	10.00 to 10.50

NET TONS.

No. 1 railroad wrought	$10.50 to 11.00
No. 2 railroad wrought	9.50 to 10.00
Arch bars and transoms	13.00 to 13.50
Knuckles, couplers and springs.	9.00 to 9.50
Shafting	13.00 to 13.50
Iron car axles	17.00 to 17.50
Steel car axles	15.00 to 15.50
Locomotive tires	14.00 to 14.50
No. 1 country wrought	8.75 to 9.00
Pipe and flues	7.50 to 8.00
Tank iron and cut boilers	7.00 to 7.25
No. 1 cut busheling	8.50 to 8.75
No. 2 cut busheling	6.00 to 6.25
Cast and mixed borings	5.25 to 5.50
Machine shop turnings	6.25 to 6.50
Railroad malleable	9.50 to 10.00
Agricultural, malleable	8.50 to 9.00
Stove plates	8.75 to 9.25
Angle splice bars (iron)	10.50 to 11.00
Angle splice bars (steel)	9.25 to 9.50

The new plant of the G. E. Hoglund Foundry Co., Gardner, Mass., is now in operation and the company is in position to make deliveries of gray iron and brass castings of any size and description.

Cleveland

Block of Bessemer Ore Sold—Steel for Coastwise Vessels.

Office of THE IRON TRADE REVIEW,
Penton Bldg., Feb. 20.

Iron Ore.—E. N. Breitung & Co. have made an additional sale of 50,000 tons of Bessemer ore, the price to be that which prevails later in the season. Owing to the many uncertainties as to what will be considered prevailing prices this year, some difficulty is being experienced in properly wording contracts.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—The market is very quiet and no sales or inquiries of importance are reported. We quote, delivered in Cleveland for first half:

No. 1 foundry	$13.75
No. 2 foundry	13.25
No. 2 southern	14.35
Gray forge	12.50
Bessemer	15.15
Lake Superior charcoal	16.50
Jackson co. 8 per cent silvery	17.05

Coke.—The coke companies are experiencing much trouble in keeping up deliveries on foundry coke, of which there is a large consumption. Some companies are declining to take addition orders until they catch up on deliveries. We quote:

Connellsville furnace coke, $1.80 to $1.90 for prompt delivery, and $1.85 to $2.00 on contract; Connellsville foundry coke, $2.25 to $2.40 for prompt, and $2.25 to $2.40 on contract.

Finished Material.—Specifications have been coming in fairly well and there has been a good demand for semi-finished material, but prices on plates, shapes, bars and sheets are showing considerable irregularity. The Carnegie Steel Co. has been awarded the shapes and plates for two coastwise steamers to be built by the Toledo Ship Building Co., requiring from 2,500 to 3,000 tons. The Great Lakes Engineering Works is figuring on the plain material for two coastwise steamers. The contract for the Harvey hotel, Cleveland, requiring 600 to 700 tons, will probably be awarded to the Interstate Engineering Co. About 150 to 200 tons for an addition to the Winton Motor Works will be furnished by the Forest City Steel & Iron Co. About 200 tons of cold twisted reinforcing bars for the Leader building were sold at 1.21¼c, delivered, or about 1.10c, Pittsburgh mill. The Northern Ohio Traction Co. has purchased 800 kegs of spikes. Fabricators and erectors state that they are figuring on numerous jobs and the outlook is that there will be a fair demand for structural material when the weather improves. The leading interest is having considerable difficulty in making deliveries, especially of plates, and is very cautious about making promises for early delivery. Its mills are more comfortably supplied with orders than are those of some other companies.

Old Material.—Little change has taken place in the market locally, although there appears to be more activity in the way of shipments from outside dealers into Cleveland. Heavy melting steel is in little demand by local consumers who have covered for some weeks and it shows a softer tendency, although no sales of quantity large enough to change the market price are noted. We quote the following prices, largely nominal, gross tons, f. o. b. Cleveland, as follows:

Old iron rails	$14.00 to 14.50
Old steel rails (under 6 ft.)	11.75 to 12.00
Old steel rails (over 6 ft.)	12.00 to 12.50
Relaying rails	19.50 to 20.00
Old car wheels	12.00 to 12.50
Old steel boiler plate	9.50 to 10.00
Malleable iron (railroad)	11.00 to 11.50
Steel axles	17.00 to 17.50
Axle turnings	8.50 to 9.50
Malleable iron (agricultural)	10.50 to 11.00
Heavy steel	11.00 to 11.50
Country mixed steel	9.00 to 9.50
Bundled sheet scrap	8.50 to 9.00

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.00 to 11.50
No. 1 busheling	9.50 to 10.00
No. 1 machine cast	11.00 to 11.50
No. 1 dealers' wrought	10.00 to 10.50
Machine shop turnings	7.00 to 7.25
Pipes and flues	8.50 to 9.00
Wrought drillings	7.00 to 7.25
Stove plate	9.00 to 9.50
Cast borings	6.50 to 7.00
Wrought iron piling plate	15.50 to 16.00
Wrought iron arch bars	15.50 to 16.00

Birmingham

Ten Dollar Quotation for Southern Delivery Disappears.

Birmingham, Ala., Feb. 19.

Pig Iron.—A higher average selling price was received in the past week than during the week previous, but the aggregate tonnage sold is comparatively small. Carloads and lots of 150 to 400 tons, all for early delivery, were the principal considerations, for which a schedule of $10.50 per ton at Birmingham for No. 2 foundry was received. The demand was from Southern territory strictly, which fact may to some extent account for the prices received; but it is not now understood that any of the local interests are solicitous of additional orders in any territory where it would be necessary to name a lower price than $10.25 to $10.50 per ton at Birmingham. No mention whatever is made of a basis of $10 per ton at Birmingham, and it is not thought that such figures can be made to apply, unless a round tonnage of those grades actually on furnace yards was offered for spot shipment. There has been considerable tonnage offered producers since the advance at figures slightly below those understood to represent the market, but in such cases, the period for delivery extended through the third quarter, and in some instances through the entire last half. The producing interests have not authorized a quotation on any delivery after July first, but would probably accept second quarter shipment to extend into the third quarter at a basis of $10.50 at Birmingham. It is noted that even on a basis such as just named, the usual differential of 50 cents per ton for the low grades does not apply other than to No. 3 foundry, as for the lower grades it is possible to obtain higher prices, owing to the scarcity of such grades. Comparatively small lots of gray forge have recently sold at $9.50 per ton at Birmingham, and it is not believed that No. 4 foundry can be had at this time for less than $9.75 per ton Birmingham. The higher grades than No. 2 foundry are also very scarce, but of course there is not the demand in proportion to the demand for low grades. A lot of 450 tons of southern warm blast charcoal iron was sold in the week at $22.50 per ton at furnace, and additional of that grade is still pending. The basic situation is practically the same as at the time of last report. We revise quotations on all grades as follows, per gross ton, f. o. b. cars at Birmingham district furnaces, for delivery in southern territory:

No. 1 foundry	$10.75 to 11.25
No. 2 foundry	10.25 to 10.75
No. 3 foundry	9.75 to 10.25
No. 4 foundry	9.25 to 9.75
Gray forge	9.50 to 9.75
Mottled	9.25 to 9.50
Standard basic	10.25 to 10.75
Off basic	10.00 to 10.50
Standard charcoal	22.50 to 23.00

These prices are per gross ton f. o. b. cars at Birmingham district furnaces.

Old Material.—The demand continues light, with consumers taking small quantities only against contracts previously entered. Carload lots of machinery cast are being moved from time to time to take the place of low grade pig iron at local foundries, but there is practically no demand for country scrap. Some tonnage of relaying rails was sold in the week at prices in line with quotations. There

is practically no stock accumulation of old axles, while the available stock of old car wheels were recently applied against a round tonnage inquiry. We continue to quote as below, but understand that prices ultimately made depend very largely on local conditions at yards. Asking prices are as follows, per gross ton, f. o. b. cars here, viz.:

Old iron axles (light)	$12.50
Old steel axles (light)	12.00
Old iron rails	11.50
No. 1 R. R. wrought	10.00
No. 2 R. R. wrought	9.50
No. 1 country	6.50
No. 2 country	6.00
No. 1 machinery	9.00
No. 1 steel	8.50
Tram car wheels	8.50
Standard car wheels	10.00
Light cast and stove plate	6.50

Cast Iron Pipe.—This market continues very active, and indications are that the producing capacity will of necessity be increased as soon as it is practicable to do so. A very large volume of small orders is being placed, and in addition to the contracts for water works systems, the requirements of local railroads for culvert construction are taking definite form. Shipments are now being made to the northwestern territory against contracts entered some time in the latter part of 1911, and specifications against recent contracts are being received. It is understood that the bulk of the tonnage recently awarded the United States Cast Iron Pipe & Foundry Co. for the city of Chicago will be furnished from local plants. It is not announced when the North Birmingham plant of the United States company will be put in operation, but repairs are being rushed, and will no doubt be completed prior to June 1 next. We continue to quote water pipe as follows, per net ton f. o. b. cars here, viz.: 4-inch to 6-inch, $23; 8-inch to 12-inch, $22; over 12-inch, average $21, with $1 per ton extra for gas pipe. These prices are firm for the small orders being placed, but are probably shaded for the large municipal contracts.

United States Ball Bearing Mfg. Co., Chicago, has changed its name to U. S. Ball Bearing Mfg. Co., and increased its capital stock from $150,000 to $300,000.

The Ford Chain Block & Mfg. Co., Philadelphia, has moved from 620 Race street to more commodious quarters at 139-141 Oxford street.

The International Smelting & Refining Co. has declared the regular quarterly dividend of 2 per cent, payable March 1.

Seattle

Business Brightens, Exports to Orient Being Quite Heavy.

Feb. 16.

The business outlook, which brightened with the opening of the new year, has justified the anticipation of the optimists at that time. New and larger orders are being received by local foundries and mills and the demand is unusually heavy this month. Exports to Japan continue to be heavy. A special shipment of steel rails valued at $37,000 and of steel bars and plates valued at $107,972 were taken from this port last week by the Chicago Maru of the Osaka Shosen Kaisha line, operated in connection with the Chicago, Milwaukee & Puget Sound railway. Additional exports to Japan in connection with the standardization of the imperial railways will be made this week by the United States Steel Products Co. which is shipping from this port and Tacoma.

Pig Iron.—Domestic pig iron has the call under current prices, except where large importations of coke are jointly made. Alabama and other eastern irons are being laid down by the railroads at prices whch made importations a losing venture. The only English irons brought to the Pacific coast have been shipped as ballast for large coke consignments. Steamers carrying English, Scotch and Welsh coke are bringing in large quantities of pig iron at a loss, making their profits on the higher grade cokes, for which there is an unusually heavy demand. Chinese Han Yang iron has practically disappeared from the local market, but several large consignments have been received by San Francisco shippers.

	Prompt.	First Quarter, 1912.
No. 1 Glengarnock	$24.00 to 25.00	25.00
No. 1 Eglinton	23.50 to 24.00	24.00
No. 1 English Jarrow	22.50 to 23.00	23.00
No. 1 Cleveland	23.00 to 23.50	23.50
English Doncaster	22.50 to 23.00	23.00

Coke.—The demand for high grade imported cokes exceeds the supply, but there is comparatively little of the better grades on the market. It is selling at slightly advanced prices. German syndicate coke is bringing $12.50 for a short ton. Plean and other light ash cokes are in demand from carload lots to shiploads, especially in southern ports. Domestic cokes are a trifle stronger, with the increased demand for foreign brands, but few large consignments are being disposed of, most calls being for carload lots.

Old Material.—Old material is receiving more attention. The Youngstown plant of the Pacific Coast Steel Co. has taken considerable of late and the demand is much more steady. While some of the lower grades of scrap from the Hawaiian Islands and west coast is selling as low as $4 per ton, the higher grade of steel is being bought eagerly at $14. Local users of old material, who have been out of the market for some time, have prepared to take heavier shipments and many yard piles long undisturbed are being moved to furnaces.

Iron rails	$14.00 to 15.00
Rerolling steel	14.00 to 14.50
Old axles	19.50 to 20.00
Car wheels	12.25 to 13.00
Smelting, scrap	11.50 to 12.00

Chicago

Specifications Satisfactory, But New Business is Light.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Feb. 20.

There has been very little change in the iron and steel situation in the west during the past ten days. Specifications against existing contracts are satisfactory and new business is light. Most of the larger producers continue to ship more tonnage than they are able to replace on their books from day to day, although some independent mills report that new business is about equal to current shipments. If the mild weather which has prevailed during the past few days continues, some demand for steel for construction purposes is to be expected. At the present time, due largely to extremely attractive prices, there is a considerable volume of structural business. The tariff agitation is a disturbing element in the trade.

Pig Iron.—The market has relapsed into the condition of extreme quiet which has so frequently characterized it during the past year. The foundries in the west are apparently well covered for their current requirements and in view of the uncertainties in the situation are not disposed to enter the market freely at the present time. Nevertheless, current sales are quite encouraging and there is a fair volume of business. The local makers hold their price on No. 2 at $14, f. o. b. furnace, which effectually prevents any large tonnage of southern iron from

coming into the immediate Chicago district. The southern producers have now established their price firmly at $14.85, Chicago, for No. 2. There is some inquiry for southern iron for shipmemnt over the last half and quotations based on $11, Birmingham, have been made covering this business. A few small contracts for last half delivery have been closed. There is no evidence of a change in the price of high silicon iron in this market. Jackson county, 8 per cent, remains at $17.40, Chicago, while iron containing 5 per cent silicon may be obtained at $15.60.

The following prices represent the market for Chicago delivery, except northern foundry and malleable Bessemer, made in local furnaces, which are quoted f. o. b. burnace:

(First Half Shipment.)

Lake Superior charcoal	$16.50
Northern foundry No. 2	14.00
Southern foundry No. 2	14.85
Southern silveries, 5 per cent silicon	15.60
Jackson Co. silveries, 8 per cent	17.40
Malleable Bessemer	14.00
Alabama basic	14.85

Billets.—The demand is fair for forging billets, but the market for rolling billets in the west is very narrow. Prices are a little higher. We quote, f. o. b. Chicago, openhearth forging billets, $26.50 and rerolling billets, $23.

Merchant Bars. — Specifications for merchant steel remain satisfactory to the mills and buyers are showing no disposition to hold up shipments. New business is undeniably quiet. The movement of steel bars out of stock is fair. The demand for shafting is quiet and prices are a little soft. Bar iron mills are enjoying a little better business and have increased their rolling schedules to about 75 per cent capacity. The prices of bar iron are a shade firmer, but are not quotably higher.

We quote, f. o. b. Chicago, as follows:

Bar iron, 1.15c to 1.20c; hard steel bars, rerolled, 1.15c to 1.20c; soft steel bars, bands and small shapes, 1.25c to 1.33c, base; hoops, 1.48c; smooth finished machinery steel, 1 inch and larger, 1.78c; shafting 60 per cent off list for carload lots, 55 per cent off for less than carloads.

On iron and steel from local stock, we quote, as follows:

Bar iron, 1.50c to 1.60c per pound base; soft steel bars, 1.50c to 1.60c per pound base; soft steel hoops, 1.80c to 1.90c, full extras.

Structural Material.—Fabricators are making extremely attractive prices, which are bringing out a considerable volume of business. The total requirements of plain material involved in fabricating contracts reported in the west last week are 6,243 tons, the majority of which was placed by railway interests. The Great Northern Railway Co. has let 1,960 tons to the Morava Construction Co. for bridge girders, towers and bents, and, it is understood, has also placed orders for 1,700 tons of bridge material with the Chicago Bridge & Iron Co. The American Bridge Co. will fabricate the rail finishing building, 1,312 tons, for the new Duluth plant of the Minnesota Steel Co. The state board of harbor commissioners, San Francisco, has let 339 tons to the Pacific Rolling Mill Co. for a pier. The Riter-Conley Mfg. Co. has taken 273 tons from the Southern California-Edison Co. for transmission line towers. A contract for six highway bridges in Lincoln county, Mont., 542 tons, has been let to the Coast Bridge Co.

We quote, mill prices, f. o. b. Chicago, as follows:

Beams and channels, 15 inches and under, 1.28c to 1.33c. For extras, see Pittsburgh report.

Plain material, out of store, is as follows:

All angles, 3 inches and larger, including 6 inches, $1.60 to $1.65 per 100 pounds; angles over 6 inches, $1.70 to $1.75 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.60 per 100 pounds, base; channels, 3 inches and larger, $1.60 per 100 pounds, base.

Rails and Track Supplies.—Makers are a little more optimistic over the rail situation, but no contracts of interest have been placed recently, aside from an order for 20,000 tons of openhearth rails from the Northern Pacific, which was awarded to the Maryland Steel Co. Negotiations have been opened by the receivers of the Wabash on the inquiry for 15,000 tons of rails, which was noted in these columns last week. Specifications for track supplies are not quite so good.

We quote, light rails f. o. b. Chicago, and track fastenings, f. o. b. Joliet, as follows:

Light rails, carloads, 40 to 45-pound, 1.16c to 1.20½c; 30 to 35-pound, 1.19½c to 1.24c; 16, 20 and 25-pound, 1.20½c to 1.25c; 12-pound, 1.25c to 1.29½c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section relaying rails, subject to inspection, $23.50 to $24.

Track fastenings, f. o. b. Joliet, angle bars, 1.50c; railroad spikes, 1.50c to 1.55c, smaller size spikes, 1.65c, base; track bolts with square nuts, 1.90c base.

Plates.—The minimum price, 1.28c, Chicago, is not being shaded, except on occasional orders involving exceptionally attractive specifications. The mills in this territory will continue operating at capacity for some time to come on business already received. Specifications are heavy, but current orders show a considerable falling off. The Birmingham-Southern Railway Co. has ordered 60 steel cars from the Standard Steel Car Co. The Mobile & Ohio has purchased 200 steel underframe ventilated box cars from the Mt. Vernon Car Mfg. Co. The Birmingham & Northwestern has ordered 50 box cars and the Savannah-Southern has ordered 50 flat cars and 15 box cars from the Central Locomotive & Car Works. The Chicago, Rock Island & Pacific, in addition to 40 steel baggage and passenger coaches, mentioned recently, is in the market for six steel dining cars and two gasoline-electric motor cars.

We quote, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches wide, 1.28c to 1.33c. For extras, see Pittsburgh report.

Store prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, 1.60c.

Sheets.—There is more evidence of competition by mills situated in Ohio and western Pennsylvania, but the local makers are meeting the situation and very little business is going out of this territory. The volume of business remains fairly satisfactory and prices are unchanged.

We quote, store prices, f. o. b. Chicago, as follows:

Blue annealed, No. 10, 1.90c; No. 12, 1.95c. Box annealed, No. 28, 2.30c. Galvanized, No. 28, 3.35c.

For mill prices, see Pittsburgh report. Freight to Chicago, 18 cents.

Wire Products.—Orders for wire, fencing and nails continue to run heavy and some new business is being received at current prices, although the great bulk of the tonnage is on old contracts. The mills in this territory continue to run well up to capacity and jobbers in the west are showing more interest in their spring requirements.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.78; retailers' carload lots, $1.88; retailers' less than carload lots, $1.98; painted barb wire, jobbers' carload lots, $1.78; retailers' carload lots, $1.88; retailers' less than carload lots, $1.98, with 30c for galvanizing; plain wire, jobbers' carload lots, $1.58; retailers' carload lots, $1.63.

Merchant Pipe and Tubes.—There is a slightly improved demand for boiler tubes out of stock and mill buyers are specifying somewhat more actively against contracts. The demand for merchant pipe is normal and is ex-

pected to increase if moderate weather continues to prevail.

We quote, store prices on merchant pipe and tubes, f. o. b. Chicago, as follows:

Iron and Steel Pipe Basing Prices.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
Butt.				
⅛ inch and ¼ inch.	71.2	50.2	63.2	42.2
⅜ inch	75.2	64.2	66.2	55.2
½ inch to 1½ inch.	78.2	69.2	71.2	62.2
Lap.				
2 inch	76.2	68.2	68.2	60.2
4½ inch to 6 inch..	77.2	68.2	69.2	60.2
Card Weight.				
7 inch to 12 inch...	74.2	63.2	67.2	56.2
Extra Strong Plain Ends.				
Butt.				
⅛, ¼, ⅜ inch	66.2	54.2	60.2	48.2
½ inch	71.2	59.2	65.2	53.2
2 inch to 3 inch...	76.2	64.2	....	....
Lap.				
2 inch	72.2	60.2	66.2	54.2
7 inch to 8 inch....	66.2	54.2	60.2	48.2
Double Extra Strong.				
Butt.				
½ inch	59.2	47.2	....	....
¾ inch to 1½ inch.	62.2	50.2	....	....
Lap.				
2 inch	60.2	48.2	....	....
4½ inch to 6 inch..	61.2	49.2	....	....
7 inch to 8 inch....	54.2	42.2	....	....

Tubes.

	Lap weld steel.	Charcoal iron.	Shelby seamless.
	Per cent.	Per cent.	Per cent.
1 inch	39	..	57½
1¾ to 2¼ inch.....	55	40	35
2¾ to 3¼ inch.....	65	50	46
3½ to 4½ inch.....	67½	50	46
5 to 6 inch.....	55	..	..

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. has taken an order for 1,200 tons of water pipe at Duluth. James B. Clow & Sons, Chicago, have taken 225 tons at Fox Lake, Wis. The average price on the 24,000 tons of water pipe recently awarded in Chicago to the United States Cast Iron Pipe & Foundry Co. was $24.15 per ton, delivered. Bids were opened Feb. 20 at St. Louis for 2,750 tons and on the same day at Toledo on 1,300 tons. On Feb. 19, bids were opened at New Castle, Ind., for furnishing approximately 3,500 tons of water pipe.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $26.50; 6 to 12 inches, $24.50, larger sizes, $24; gas pipe, $1 a ton higher.

Old Material.—The range of transactions continues narrow and there is very little life in the local scrap market. No. 2 busheling and railroad malleable are somewhat weaker. There is evidence that many country dealers who have been holding quantities of high priced scrap for long periods are getting a little weary of the load and are preparing to dump their holdings on the market. We note an offer of 1,500 tons of No. 1 country wrought scrap at $10.25, Chicago. Bar iron mills are operating faster and are increasing their consumption of scrap.

We quote, for delivery in consumers' yards, Chicago, as follows:

GROSS TONS.

Old car wheels	$13.00 to 13.50
Old iron rails	14.50 to 15.00
Rerolling rails (5 ft. and over)	12.25 to 12.75
Old steel rails (3 ft. and under)	11.75 to 12.25
Frogs, switches and guards	10.50 to 11.00
Heavy melting steel	10.50 to 11.00
Shoveling steel	10.00 to 10.50

NET TONS.

No. 1 R. R. wrought	$10.75 to 11.25
No. 2 R. R. wrought	9.75 to 10.25
Arch bars and transoms	13.50 to 14.00
Knuckles, couplers and springs.	10.00 to 10.50
Shafting	13.50 to 14.00
Iron car axles	18.00 to 18.50
Steel car axles	15.50 to 16.00
Locomotive tires	13.50 to 14.00
Dealers' forge	8.75 to 9.25
Pipe and flues	8.00 to 8.50
No. 1 cast	11.00 to 11.50
No. 1 busheling	8.75 to 9.25
No. 2 busheling	6.25 to 6.75
No. 1 boiler cut	7.00 to 7.50
Boiler punchings	12.50 to 13.00
Cast and mixed borings	6.00 to 6.50
Machine shop turnings	6.50 to 7.00
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.25 to 9.75
Angle bars, splices, etc., iron..	12.50 to 13.00
Angle bars, steel	9.75 to 11.25
Stove plate and light cast scrap	9.25 to 9.75

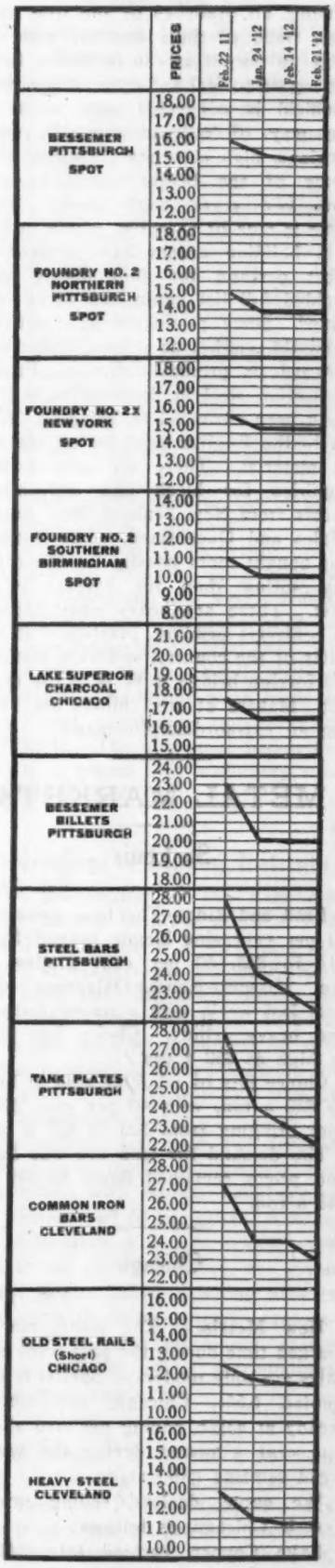
British Market

Coal Strike Threat Has Dampened Market Ardor Somewhat.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Feb. 10.

Pig Iron.—The British iron and steel trade is having an uphill fight against contrary circumstances, very trying to the patience, because there is any amount of work to be done. The labor unrest has now spread to the most important department of all, namely, the coal trade. A series of conferences between colliery owners and workpeople came to an abrupt termination this week, without a settlement, and the next step, presumably, will be the handing in of notices over all the British coal fields. The situation is not quite hopeless, but very nearly so. The rock upon which the negotiations have split is the impossibility of settling the minimum wage. The trade in the Birmingham district is suffering from restricted output, although prices are satisfactory. For the time being the pig iron market is rather quiet. In Cleveland there has been a little recovery, but the selling price yesterday was 49s 1½d ($12.03) for warrants, with 49s 11d ($12.22) three months, which is rather better than a week ago. The amount in store is 529,000 tons. The demand for pig iron is only moderate, but the position is strong enough to enable the makers to quote a

PRICE CHART



shilling per ton more than the merchants.

Finished Material.—While there is no great amount of new business moving, all branches of the iron and steel trade continue healthy, with as large an output as can be made, having regard to fuel and other difficulties. Sheffield is congested with work in the way of railroad material, ship forgings, high class steel, cutlery, etc. Some of the bigger establishments have two years' work ahead. The same is true of Glasgow, where heavy ship building orders have created a great demand for ship plates, and enabled full list quotations to be obtained. Some producers have retired from the market as sellers, either for forward or prompt delivery. Prices of section steel in Scotland have this week been advanced 5s, bringing them up to the English level for all classes of material. There are very heavy inquiries for black and galvanized sheets from New Zealand, New South Wales and Queensland, while Canada has bought more heavily for the coming spring than for several years past. There are heavy constructional contracts pending, practically in all parts of the country, and very attractive foreign bridge work is in the market. Makers of steel billets are finding an extraordinary demand.

METAL MARKETS

St. Louis

Feb. 19.

Lead and Zinc.—The base price for 60 per cent zinc blende ranged from $47 to $43, 60 per cent grades, in the Missouri-Kansas-Oklahoma district last week, with a strong demand and heavy selling. Choice lots sold as high as $50 a ton.

Choice lots of calamine sold as high as $30 a ton, with 40 per cent qualities bringing from $23 to $27 a ton.

The demand for lead ore was light and prices remained down to $46 to $48 a ton.

Chicago

Feb. 19.

New Metals. — The metal market marked time during the past week and sales are only moderate. Spelter is now quoted 6.55c, Chicago, and tin is steady at 43¼c, having declined about one cent a pound during the week. Lead remains quiet at 4c.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Lake Copper, carload lots, 14½c; casting, 14¼c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 6.55c; lead, desilverized, 4c in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $8.25 list, f. o. b. La Salle, in car lots of 600-pound casks; pig tin 43¼c. Cookson's antimony, 8¾c; other grades, 7½c to 8¼c.

Old Metals.—The market on old metals shows no special change and has been quite inactive during the past week.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Copper wire, crucible shapes, 13c; copper bottoms, 11½c; heavy cut crucible copper, 13c; heavy red brass, 11¾c; heavy yellow brass, 9½c; No. 1 red brass borings, 9½c; No. 1 yellow brass borings, 8¼c; brass clippings, 8½c; lead pipe, 3¼c; zinc scrap, 4c; scrap aluminum, 12c; tea lead, 3¾c; No. 1 pewter, 28c; block tin pipe, 39c; tin foil, 32c; linotype dross, 3¼c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3¼c; prime slab zinc dross, $80 to $85 a ton.

Names Honorary Committee

Dr. William H. Tolman, director of the American Museum of Safety and chairman of the American committee of the International Congress for the Prevention of Accidents, has announced the members of the American honorary committee as follows: James McCrea, E. A. S. Clarke, George B. Cortelyou, Philip T. Dodge, S. C. Dunham, Elbert H. Gary, John Hays Hammond, A. Barton Hepburn, Seth Low, Charles Nagel and James Speyer. On the national committee 38 representatives of various industries and other interests will serve.

Prepares Plans for New Plant

The Duff Mfg. Co., Pittsburgh, has purchased a large plot, 140 x 340 feet, at Chartiers and Hoffman streets, northside, Pittsburgh, at present occupied as a lumber yard, and announced that plans are being prepared for the erection of a new plant this spring. J. R. McGinley is president of the company, which manufactures the Barrett lifting jack and has for some years occupied a plant in another portion of the city which it has outgrown. The plant will more than double the capacity of the works, and provisions are being made for still greater capacity as needed.

The Durham Iron Co. advises that it is dismantling the Durham blast furnace at Riegelsville, Pa.

MAKES GOOD SHOWING

J. G. Brill Co. in 1911 Had Best Year Since 1907.

The J. G. Brill Co. has presented its annual report for the year ended Dec. 31 last, which, as compared to the previous year, shows the following:

	1911.	Increase.
*Total sales	$5,870,937	†$ 89,872
Expenses	5,181,498	† 338,325
Net profit	$689,409	$248,453
Depreciation	134,429	19,805
Balance for div.	$554,980	$228,648
Dividends	320,600	
Surplus	$234,380	$228,648

*And other income.
†Decrease.

On Feb. 10 last the company had orders in process of completion amounting to $3,152,156, with a good outlook for profitable work for the remainder of the year. In his report President James Rawle said in part:

"The combined profit resulting from the operation of the five plants during the year 1911, after charging to repairs and maintenance of buildings, machinery and tools the sum of $164,986, amounted to $689,409, from which there has been set aside for depreciation $134,429, leaving a net profit for the year of $554,980. While during the year 1911 the conditions which governed the obtaining of orders and their execution by your company were by no means normal, yet they were much improved in comparison with any year since 1907. This resulted in earnings from the year's business sufficient, after the deduction of all liberal allowances for repairs, maintenance and depreciation, not only to meet the full dividends on the preferred stock declared during the year, but also to add to the combined surplus of your companies the sum of $234,380."

At the annual meeting of the company, M. Herman Brill and Edward P. Rawle were re-elected directors for a term of three years.

Shelby Plant On Double Turn

Pittsburgh, Feb. 20.—The Shelby plant of the National Tube Co. at Ellwood City, Pa., will be put on double turn within the next week. The present operations of this plant are on a larger schedule than for many months.

The Allens Creek stack of the Bon Air Coal & Iron Co., Mannie, Tenn., banked recently for repairs, which was to be blown in about Feb. 20, will not go in until March 1.

LACKAWANNA REPORT

For Last Quarter Shows Marked Falling Off.

The final quarterly statement of the Lackawanna Steel Co. for the year ending Dec. 31, 1911, has been issued by the Lackawanna Steel Co., and this affords a complete summary of the annual income account which shows a total earnings of $3,035,042, or a decrease of $2,914,194 from the preceding year. The surplus for the year is shown to be but $82,803, or a marked falling off fro mthe total of 1910, which was $2,533,104.

The income account compares with the previous year as follows:

	1911.	Increase.
Total income	$3,035,042	*$2,914,194
Interest on bonds, etc.	1,750,000	20,771
Balance	1,285,042	*2,934,965
Deductions	1,202,239	*484,663
Surplus	82,803	*2,450,302

*Decrease.

At the close of the year 1911, the company had a total of 289,971 tons of unfilled orders upon its books compared with 226,103 tons at the corresponding date the previous year, or an increase of 63,868 tons. The complete annual report of the company containing the balance sheet and President F. A. S. Clarke's review of the year will be made public at the time of the annual meeting early in March

New Sales Company Organizes

The Vulcan Engineering Sales Co. has been organized and incorporated with offices in the Fisher building, Chicago, and 30 Church street, New York. The company controls the entire product and will handle all sales of the Hanna Engineering Works, Chicago; the Mumford Molding Machine Co., Plainfield, N. J., and the Q. M. S. Co., of New York. Further factory arrangements are under way and the Vulcan company will own and manufacture a number of railway special tools and equipment for shop and maintenance departments. The officers are: President, H. K. Gilbert, formerly vice president of the Buda company; secretary and treasurer, P. W. Gates, now president of the Hanna Engineering Works, and formerly president of the Gates Iron Works. E. H. Mumford, now vice president and general manager of the Mumford Molding Machine Co., and William L. Laib, vice president and secretary of the Hanna Engineering Works, will continue in the same capacities as at present.

The base price of sheet zinc has been advanced by leading manufacturers from $8 to $8.25 per 100 pounds, delivered f. o. b. cars, Illinois points, in 600-pound casks. This price applies to gage Nos. 9 to 19, the usual extras being charged on other gages.

INCREASE SHOWN

Annual Report of Fore River Co, Indicates Growth.

The report of the Fore River Ship Building Co., for the year ended Dec. 31 last, shows the following: Plant, less depreciation, $3,588,374. Current assets include: Cash, $99,570; accounts receivable, $315,271; notes receivable, $371,375, or a total of $1,686,217. Inventory and work in progress include; Material on hand, $313,223; work in process, $252,773, or a total of $565,-996. Charges, total, $30,375. Current liabilities include: Accounts payable, $497,904; reserve, $164,887, and surplus, $517,474.

President Francis T. Bowles, in his remarks to the stockholders, said:

There have been a number of minor additions to the plant and machinery during the year. All items of repair and maintenance to plant have been charged to current expense and $120,-000 has been charged off for depreciation. The surplus has increased by $187,000.

The following vessels were under construction, Dec. 31: Argentine battleship Rivadavia, six submarine torpedo boats, two torpedo boat destroyers, one steel fishing vessel (since delivered) and one steel sea-going suction dredge. Since Jan. 1, 1912, a contract has been signed for a 27,000 ton battleship for the United States navy, to be fitted with Curtis marine turbines.

During the year there have been completed and delivered two steel fishing vessels, one steel freight and passenger steamer, one steam collier and one torpedo boat destroyer. The turbine machinery for two Italian cruisers have been completed and shipped. The turbine machinery for the Argentine battleship Moreno is about completed.

The average number of employes for the year was 3,392. The force at present is approximately 3,319. The yard has been operating during the past year at about two-thirds of its capacity.

At the annual meeting of the stockholders of the company, on Feb. 13, the retiring directors were re-elected and at a subsequent meeting of the board the old officers were reappointed.

Present officers and directors of the Warren Foundry & Machine Co., Phillipsburg, N. J., were re-elected at the annual meeting.

REPORT PRESENTED

Showing Statement of American Iron & Steel Mfg. Co.

The American Iron & Steel Mfg. Co., Lebanon, Pa., has issued its 12th annual report for the year ended Dec. 31 last. The general balance sheet as of Dec. 31, 1910, compares as follows:

Assets:—	1911.	1910.
Cash	$1,100,388.66	$1,025,062
Bills receivable	None.	11,258
Accounts receivable	461,913.50	576,322
Inventory	1,281,318.99	1,587,643
Insurance and taxes.	4,760.28	6,237
*Real estate	5,920,662.07	4,936,635
Total	$7,889,043.50	$8,143,158
Liabilities:—		
Preferred stock	$3,000,000	$3,000,000
Common stock	2,550,000	2,550,000
Wages accrued	None.	None.
Accounts payable	None.	None.
Undivided profits	2,339,043.50	2,593,158
Total	$7,889,043.50	$8,143,158

*And plant equipment, less allowance for depreciation.

In his comment on the report, President James Lord said:

"As in the previous year, prices continued to decline, without any recovery, throughout the year. During the year a special dividend of 2 per cent, amounting to $111,000, was paid in addition to the regular dividend of 5 per cent. Additions were made to plants and equipment amounting to $129,026.45. The allowance for depreciation of plants and machinery now amounts to $880,000."

Proceedings of Mining Institute

The proceedings of the Lake Superior Mining Institute at their 16th annual meeting held at Crystal Falls, Mich., in August of last year, have just been put into book form and published. The publication has 265 pages and includes a number of diagrams showing improved methods in mining machinery as well as a map of the Menominee range.

The meeting last year was devoted exclusively to the consideration of the Menominee, with especial reference to the western end of the range. A number of interesting papers, which were read at the annual meeting, are given in full in the book, including articles treating with cost systems, exploratory work, mining machinery, safety devices and the social surroundings of the mine employe.

Blast furnace E of the Bethlehem steel works was blown in Feb. 13 Gov. Tener, of Pennsylvania, who was a guest of Chas. M. Schwab, president of the Bethlehem Steel Co. at the time, applied the torch.

Strong Protest Against Free Foreign Iron Ore

Convincing Argument by C. D. Dyer Before Senate Committee Against Underwood Bill

Office of THE IRON TRADE REVIEW, Hibbs Bldg., Washington, D. C., Feb. 21.

The senate finance committee met on Wednesday morning, to listen to the representatives of the iron and steel industry in their general protest against the passage of the proposed tariff bill. Owing to the importance of the meeting, the committee met somewhat earlier than usual, and the attendance of members was uncommonly large. The steel representatives present were:

C. D. Dyer, of W. P. Snyder & Co., iron ore;

James A. Campbell, of the Youngstown Sheet & Tube Co., steel pipe;

W. H. Rowe, of Pittsburgh Steel Co., wire nails and fencing;

W. U. Follansbee, of Follansbee Bros. Co., tin plate;

E. T. Weir, of Phillips Sheet & Tin Plate Co., tin plate;

Willis L. King, of Jones & Laughlin Steel Co., structural shapes and plates;

S. P. Ker, of Sharon Steel Hoop Co., hoops and cotton ties;

W. S. Horner, of American Rolling Mill Co., sheet steel;

Frank Tenney, of Pennsylvania Steel Co., billets, blooms and slabs;

J. G. Butler Jr., Brier Hill Steel Co., merchant pig iron;

Leonard Peckitt, Empire Steel & Iron Co., pig iron.

The first speaker was C. D. Dyer, vice president of the Shenango Furnace Co., who spoke in behalf of the iron ore interests as follows:

Indicates a Tendency

"The Lake Superior iron ore industry will not take up the time of the committee in making any special protest against the effect of reducing the tariff rate on iron from 15 cents per ton to nothing, except as it indicates a tendency to keep the market on the Atlantic seaboard open for foreign ore, to the exclusion of our home product.

"Shipments of ore from the Lake Superior region during the year 1911 were 35,000,000 tons, and in 1910 and 1909 they were about equal, aggregating about 42,000,000 tons in each year, and the capacity of the region, measured by its facilities for transporting ore down the lakes is about 50,000,000 tons.

"During 1911, 2,000,000 tons of foreign ore entered the United States—revenue to the government from which was less than $300,000.

"Practically no Lake Superior ore has been sold in what we term the eastern market for three years and if the enlargement of the opportunities of the industry is a matter of concern, foreign iron ore should be subject to a tariff rate of at least 50 cents per ton, which is about 1 cent per unit, as ores are measured in these days. Under such a condition, and in order to deal in the east, it would still be necessary for the Lake Superior ore producers to make a very considerable concession in the ideas with which they are accustomed to figure the values of their ore.

"To indicate the effect upon the general business of the country, as illustrated by the 2,000,000 tons of foreign ore received during the year 1911, and which produced to the government something less than $300,000 in the way of revenue, an estimate is made showing that had the equivalent of this ore been produced and transported from the Lake Superior region, over $3,000,000 would have been paid directly in wages to workmen engaged in mining, manufacture, transportation and other pursuits and the national balance of trade would have gained over $6,000,000 in our favor.

"It may be argued, and it is probably true that a 50 cent tariff rate would have the effect of increasing the cost of the ore mixtures at eastern furnaces, but if so, such increase would about equal the difference between the cost of production at home and abroad, as is indicated by the market prices of the two products, and the effect would be to at least bring the Lake Superior producer and the eastern furnace men together to negotiate. The tonnage involved would probably have a large influence in inducing the Lake Superior producer to make some concession, and perhaps the railroads to hold out some inducements to secure the business, as the present tariff rates of the railroads are merely paper rates and produce no revenue to speak of.

Should Raise the Rate

"To our minds, the ore proposition is before congress in its function as presiding over the business of the country, to decide whether one department of that business might not be called upon to contribute $500,000 to $1,000,000, to enable another department in the same business to actually increase its earnings by about $3,000,000.

"If we are to keep in mind in any province of business the idea of protection of American industries, the cause of American iron ore presents very convincing arguments in favor of a protective rate and we think that 50 cents per ton is the least rate which would have any effect in that direction.

"The status of the iron ore situation as far as Lake Superior is concerned is as follows: Since the panic of 1907, following the lead of the Steel Corporation not only at the mines, but at our furnaces, while we have curtailed production and shut down here and there, in no instance has the high rate of wages that has been in existence been disturbed, neither at the mines, on the railroads, on the vessels or at the furnaces. As a matter of fact, the railroads have in the meantime advanced their labor. Roughly, 75 to 80 per cent of the cost of ore is represented by labor, either at the mine, the railroads, the lakes, or with the supply companies who furnish supplies. We have thought once or twice that we would have to liquidate labor and have been holding on with the hope of better things, until business would get over the dead center. There is no apparent hope for this in the immediate future and, with drastic tariff legislation, labor liquidation will be forced upon us whether we wish to consider it or not. The tariff as far as ore, iron and steel is concerned, is no longer a protection to the industry and not even on the present rates a protection to the labor. If we are going forward on a protective basis, we should at least have sufficient protection to protect the labor, without asking for protection possibly on our profits, and instead of being a protective tariff for the industry it should be called a protective tariff for labor.

How Coast Market was Lost.

"Under the present tariff, the rate on ore is too low, as well as pig iron. We have lost the Pacific coast to the foreigners in almost all departments and in 1911, there were about 2,000,000 tons of ore brought into the eastern market from foreign countries. Assuming this ore to be worth in the neighborhood of $8,500,000, there were displaced between $5,500,000 and $6,000,000 worth of labor to the miners, railroad employes, vessel employes, and others in the Lake Superior iron ore industry. In addition to this, our furnaces on the eastern seaboard paid to foreign miners and vessel owners $8,500,000, which went out

of the country. In prosperous times, even with the tariff of 40 cents a ton, foreign ore came into the country, but only to the extent that our labor could not produce it. Since the passage of the Payne-Aldrich bill, we have, as above mentioned, lost this business that we enjoyed in the east. The states of Minnesota and Michigan have imposed burdens in the way of taxes, which in many cases will run as high as 10 cents a ton on the ore produced from certain mining properties. The Canadian government at the present time is proposing to pay their manufacturers a bounty of $1 a ton on pig iron, and where the pig iron is made from Canadian ore, an additional bounty of about 60 cents a ton, which is bound to stimulate production of iron ore in Canada to a point where there will be a very considerable surplus to be shipped to this country. Every ton of ore and every ton of pig iron imported displaces three tons of ore which could have been mined by American miners. Some of the foreign ores are mined by workmen receiving 40 cents a day; this is true in Spain. The miners of Lake Superior in underground work receive $2.65 per day or more, according to the nature of their work.

"Therefore, we should not only protest strongly against the Underwood bill, but there should be a restoration of the duties on iron ore prior to the Payne-Aldrich bill, and also on pig iron, in my opinion, as its effect will simply be an economic one. Internal competition will keep the price of iron and ore within reason and in prosperous times there will be both pig iron and ore imported. In times of depression, however, I feel that our own labor should have every consideration and be furnished all the work possible, to the exclusion of giving the business to foreigners."

At the annual meeting of Witherbee, Sherman & Co., Inc., Feb. 19, the present officers and directors were re-elected. These include F. S. Witherbee, president; E. A. S. Clarke, vice president; W. C. Witherbee, treasurer, and L. W. Francis, secretary. These officers with Moses Taylor and Geo. C. Foote compose the directors. The Port Henry Iron Ore Co. at its annual meeting also re-elected the present corps of officers and directors. The officers are J. T. Tower, president; W. C. Witherbee, vice president, and H. N. Brinsmade, secretary and treasurer. The officers and Jas. A. Burden and E. S. Atwater, compose the board.

The Elk Fire Brick Co., St. Marys, Pa., has increased its capital stock from $100,000 to $200,000.

MACHINE TOOL MAKERS PROTEST

Strong Argument Against Proposal to Put Their Product On Free List

The American machine tool builders have presented the following summary of an argument before the senate finance committee asking that an amendment be passed striking out the item "Machine Tools" from the free list in the Underwood tariff bill, and continuing this item under the tariff rate of 30 per cent as fixed by the present law:

First:—There is no specific principle of tariff-making under which the placing of machine tools on the free list can be justified.

(a) Anyone believing in the American policy of promoting American manufacturing, of course, strenuously opposes the placing of machine tools on the free list, since it can be absolutely proven that the industry needs the reasonable protection of 30 per cent now afforded. Under the Payne law this rate on machine tools was reduced from 45 to 30 per cent. A study and close analysis of cost conditions as they exist today would fully warrant a restoration of the 45 per cent rate from the viewpoint of a reasonable protective principle in tariff-making.

(b) Placing machine tools on the free list is directly contradictory to that principle of tariff-making which makes production of revenue the prime consideration. The statistics show that the United States government cleared $57,324 in revenues on importations into this country of foreign-made machine tools in the fiscal year of 1911. Under the existing 30 per cent tariff rate this figure will rapidly increase year by year.

(c) By placing machine tools on the free list this bill compels the American machine tool industry to compete on the one hand with low priced foreign labor, about one-half our wage rate, but equally efficient with ours, and, on the other hand, with all other employers of American labor in this country (all of whose products are still protected by this bill) using identically the same class of labor as employed in the machine tool industry and who continue to pay the higher American scale of wages. At the same time this bill establishes a tariff rate on every item of material which goes into the construction of a machine tool, and while some of these rates may be lower than the present existing rates, yet they will not permit the American machine tool builder to purchase one single item of his material at any lower price than he pays today under the existing tariff schedule.

Second:—Proof is at hand to show that the present 30 per cent tariff on machine tools does not fully equalize the difference in cost of labor here and abroad, special reference being had to Germany—our most formidable competitor.

We have the statistics to show that the imports of German machine tools, even under the existing tariff rate of 30 per cent, will rapidly increase. We have proof to show that under free trade and on the basis of regular prices now quoted by our German competitors in Germany (not the lower export price, in accordance with the regular German custom, which is the price we would actually have to meet here under free trade), German copies of American machine tools, or German competitive machines equal or superior to the American machines would flood this country at an average of 30 per cent to 40 per cent under the price of the American machine tool. This 30 per cent tariff rate, therefore, is needed to equalize the difference in cost here and abroad. To put this industry on the free list and at the same time to give it no reduction in the cost of material or the cost of wages and overhead means to destroy it.

Third:—Keep in mind that while this bill proposes to open our market free to our German competitors and free to all other foreign competitors, it does not secure for us any relief whatever in the tariff rates levied against us by foreign countries, in some cases practically prohibitive.

Canada, for instance, would continue a tariff rate against machine tools of 27½ per cent ad valorem, while our markets would be opened free to the Canadian manufacturers of machine tools. There would remain only one logical way in which the American machine tool manufacturers could ultimately meet this foreign competition, and that would be to move their plants to Canada, and especially to Germany, where they could make these same machines at lower costs and ship them into the American markets free on equal basis with the Germans, and, at the same time, meet the German competitor in his own market under equal conditions of cost, without the tariff handicap. But

this would simply mean that America would lose an industry, while our foreign competitors would gain one.

Fourth:—If it should be argued that, under this provision, foreign machine tools of equal value with the American machine tools would come into this market and sell to the American consumer for his benefit at an average of 30 per cent under the existing American prices, and that, therefore, the American consumer is entitled to this benefit, notwithstanding the fact that such a provision would destroy the American machine tool industry—then why does not this bill put all other finished metal products on the free list, wherever the foreign-made commodity would thereby come into America and sell at a lower price to the American consumer than does the similar American product?

This course might work disaster on American industry as a whole, but at least it would not single out and discriminate against any single American industry, as does this provision in the Underwood bill discriminate against the American machine tool industry.

Fifth: — One of the suggestions which has been advanced as being a possible ground on which machine tools have been placed on the free list in this bill is that this American product has been largely exported to foreign countries, while the imports of foreign machine tools have been small.

(a) It can be absolutely established by abundant data that the American exports of machine tools are diminishing, especially in Germany, from which country we would suffer most under free trade conditions. The simpler types of American machine tools, such as planers, shapers, lathes, drills (manufactured by 85 per cent of the American concerns engaged in this industry) can no longer be sold in Germany, except to some degree under an occasional abnormal trade demand when our German competitors are over-sold and can not make delivery. Some few highly organized and more or less "special" American machine tools still have a market in Germany, but it can only be a temporary one. It is to be noted that the consumer or user of these tools in foreign countries pays a higher, and in Germany and other protected countries, a very considerably higher price for them than does the American consumer or user.

(b) It is claimed that the imports of foreign machine tools have been small, but an analysis will show that the percentage of increase is exceedingly rapid when it is considered that only a few years ago there were practically no imports on this item, while in 1911 the imports rose to $191,082; notwithstanding that during this year the German plants have been oversold and not able to take care of the demand in their own country, while the American machine tool plants have been running short time because of the low demand here. Under the present conditions of competition, with existing 30 per cent tariff rate, this percentage will rapidly increase.

(c) However, why should one American industry be penalized, so long as it can be absolutely shown that its average profit on actual capital is only such as to pay a fair rate of interest on investment, because it has been enterprising enough to secure, in the past at least, orders from some of the foreign markets, and thereby employ American material, American labor and American capital to fill these orders?

Sixth:—The above propositions, impartially considered, can only drive us to the conclusion that machine tools were placed on the free list in this bill through the absence of specific and properly interpreted statistics and information.

We appeal, therefore, for the passing of an amendment to correct this error in both houses of congress, thereby eliminating machine tools from the free list in this bill and continuing them under the present tariff rate of 30 per cent.

Seventh:—A committee of American machine tool builders appeared voluntarily before the ways and means committee of the house preceding the enactment of the present 1909 tariff law, agreeing to a reduction of the tariff rate from 45 per cent to 30 per cent as an absolute minimum.

This was done in an effort to hold down foreign tariffs at that time threatening to be advanced, and to obtain for us the most favored rates in all countries with the hope that our export trade could be at least temporarily prolonged.

The above facts are recited only to show that already the American machine tool industry has gone on record as desiring only such a minimum tariff rate as will fairly equalize the difference in the costs here and abroad, and only on such elements of cost as adhere in the fundamental economic differences in the two countries. We want no protection for our brains or our energy. We are willing and ready to have all the conditions of our industry thoroughly, impartially and scientifically investigated and are ready to abide by any tariff rate that may fairly result from an investigation of this character.

Personals

Coleman B. Ross, formerly associated with the Linde Air Products Co., has accepted a position with the Independent Pneumatic Tool Co., Chicago. Mr. Ross is connected with the Pittsburgh office of this concern.

Thos. A. Edison, the inventor, celebrated his sixty-fifth birthday anniversary, Feb. 10. A dinner in his honor was given at his home at West Orange, N. J., and a testimonial and loving cup was presented to Mr. Edison by his associates of his pioneer days.

William E. Hartman, gas engineer for H. Koppers, has returned from a two months' stay in Europe studying the latest improvements of the Koppers by-product system. Mr. Hartman's investigation took him to the plants of the company in Austria, Germany, France and England.

J. A. Fitzpatrick, Inc., steel construction, with offices at 1123 Broadway, New York, have succeeded the firm of Fitzpatrick & Coombs, Inc. The officers are J. A. Fitzpatrick, president; Thos. S. Griffin, vice president; David Mattoon, treasurer, and H. R. Spence, chief engineer.

To commemorate his seventieth birthday anniversary, a dinner was given in honor of William Conway, Pittsburgh, on the evening of Feb. 14, at the University Club in that city by 100 leading business men, in which the iron and steel industry was well represented. Mr. Conway is one of the pioneer iron manufacturers of Pittsburgh.

Announcement was made this week of the appointment of Samuel C. Woods as superintendent of the Howard axle plant of the Carnegie Steel Co., of Homestead. Frank J. Black has been appointed superintendent of the wheel department, with B. F. Fence and C. D. Rafferty, assistant superintendents. Mr. Woods takes the position left vacant by James H. Grose, who went to Youngstown.

Wm. E. Corey, formerly president of the United States Steel Corporation, has been made a director of the International Smelting & Refining Co., succeeding Adolph Lewisohn. This is the third board connected with the amalgamated interests which Mr. Corey has recently joined, the other two being the Greene Cananea and the Inspiration Consolidated Copper Co.

Methods of Safeguarding Machine Tools

The Prevention of Accidents in the Machine Shop and the Equipment of Tools to Protect the Workmen

For the protection of operators and to prevent accidents, many machine tool builders are now either enclosing gears entirely, or are equipping them with guards which in no way interfere with the operation of the machines. In a recent installation of machines, of the same size and type, and built by the same maker, one of the machines was fully guarded, one was partly guarded and the third was without guards, which illustrates the rapid progress now being made in safeguarding this line of equipment. These three machines were taken from three separate shop lots and the changes were made while several lots were going through the shop.

Some machine tools are entirely redesigned when equipped with guards, while the geared head for motor drive represents a late development. A number of builders merely protect the gears with half or full guards, and do not change the belt drives formerly employed. Where guards are merely attached to a type of machine already built, a comparatively simple and convenient device must be made so that it will be used, if removable, and so

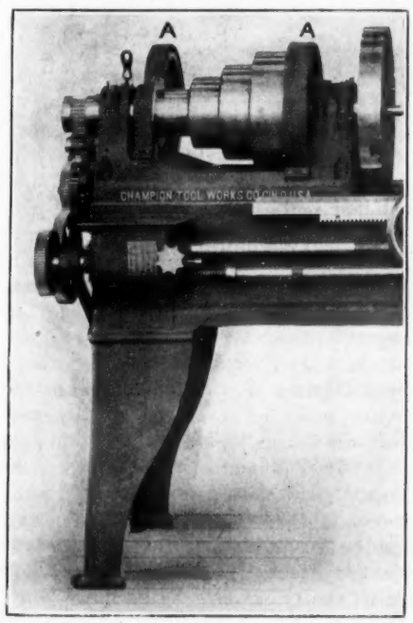


FIG. 1—LATHE WITH BACK GEARS PROTECTED BY GUARDS

that the various parts of the machine are easily reached for oiling and adjustment.

Figs. 1 and 3, illustrate a standard 16-inch, quick change lathe showing the back gears fully protected by the guards, *A*. In Fig. 3 the guard, *D*, has been added to cover the change

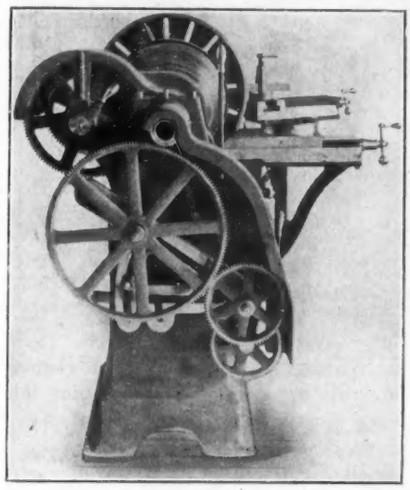


FIG. 2—EXTENSION LATHE, SHOWING GEARS PARTLY PROTECTED

gears. This guard is made of cast iron and covers the entire end of the lathe head and bed. It is supported by two pin-and-socket hinges at the rear of the bed and head, which allows it to swing out horizontally away from the end of the lathe. This leaves the gears exposed and unobstructed for oiling and changing. A short handle, *B*, is used to swing back the guard and a catch, *E*, holds it in position when closed against the end of the lathe. As equipped in Fig. 3, the lathe has 48 changes of speed obtained through the speed box, the knurled disc and the shift handle, *C*.

Fig. 2 is an end view of an extension bed gap lathe with guards over the back and head gears. As this lathe is not fitted with quick change gears, considerable gear adjustment is necessary for different kinds of work and the entire train of gears is not completely covered, but a sectional guard covers the front and top of the gear train. As this does not interfere with oiling, it is made stationary and fastened directly to the frame of the bed. Fig. 6 illustrates an 18-inch belt-driven lathe with a single, back-geared head protected by the guards, *A*. The feed change gears are enclosed in the boxes, *B* and *C*.

Fig. 4 shows a 36-inch motor-driven, triple-geared, engine lathe, with guards over the back gears, the triple gears, the reverse plate gears on the end of the headstock and over the internal gear on the face plate. The modifications due to the application of motor-drive are clearly shown in Fig. 5, which is a back view of the headstock illustrated in Fig. 4. This head is equipped throughout with sight feed oilers and external levers for operating the change gears so that it is not necessary to remove the guards for oiling or changing. The guards are made sectional and are bolted in position so that they can be quickly and easily removed if desired.

Fig. 8 is a heavy duty, motor-driven engine lathe with all the gears enclosed in a solid headstock casting with the motor placed directly on top of the head and driven by a train of reduction gears. Both of these headstocks are symmetrical and rigidly built, in addition to furnishing full guards for all gears, thereby protecting the operator as well as preventing chips from falling into the gears.

Fig. 9 is a 48 by 48-inch spur geared planer, showing the driving belt side.

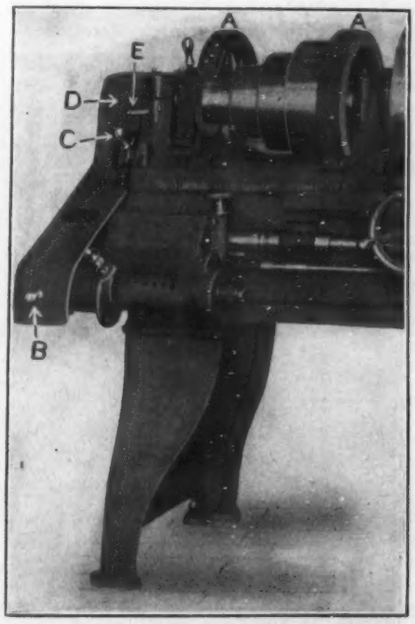


FIG. 3—LATHE WITH GEARS FULLY PROTECTED

On the opposite side the reducing gears are fully covered with a cast iron guard. For the driving belts a protecting hand rail or tight board

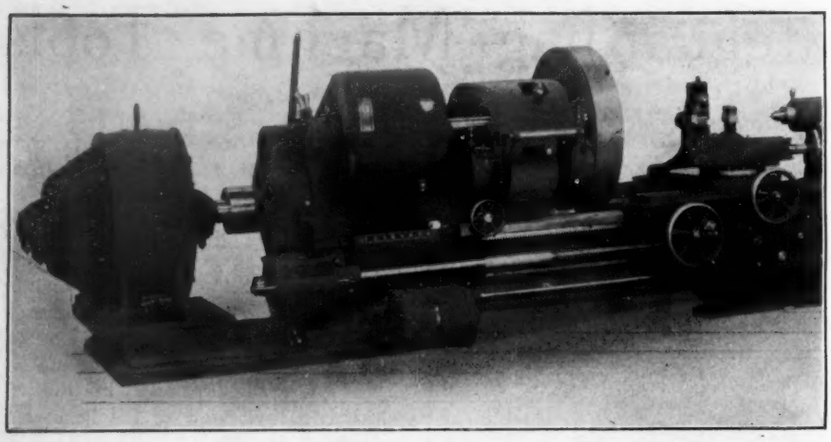


FIG. 4—A 36-INCH MOTOR-DRIVEN ENGINE LATHE WITH GEARS AND OPERATING PARTS FULLY ENCLOSED

box is generally built around them, as it is more convenient than encasing the driving belt pulleys with a cast iron box. The feed gears on the head operate intermittently and are generally left unguarded, as their movement is very slow. At *A*, Fig. 9, is a double-pointed trip, hinged to the shifter lever. This trip is lifted when the table is to be run forward without disturbing the setting of the rear dog. This location of the trip eliminates the possibility of the operator having his fingers caught, as is often the case when the latch is placed on the dog itself. A safety locking pin, *B*, in the shifter lever is used to prevent the accidental starting of the table when oiling or repairing the planer.

The value of a systematic cleaning system with certain men detailed to constantly keep the floors clean and not merely to clean up occasionally, can hardly be stated in figures. A greasy floor covered with chips, drillings, etc., is not only the cause of many accidents, but also affects the discipline of the shop. Where large work is handled with a crane plenty of room around each machine is essential in preventing accidents. Carefully inspecting all cranes for loose or missing bolts and nuts at regular intervals by a man responsible for this work, and the regular annealing of crane chains will prevent a large number of accidents due to crane or crane block failures.

Providing cranes for handling work on even the smaller machines avoids the necessity of the operator straining or injuring himself when lifting castings onto or from the machine. Fig. 7 illustrates a grinder served by a wall jib crane. A section of double-ply belting with a hook at both ends forms the sling in which the work is carried.

In shops where quality rather than quantity is the chief requisite there are, of course, fewer accidents. When a man is not rushed in his work he will avoid taking chances that might cause injuries when he is hurried. In shops where all the tools used on each machine are kept close to that machine, the number of accidents is below the average.

The machine tool builders have already accomplished a great deal of useful safeguarding, particularly in protecting the workmen from the changes of gears in metal working tools. Shafts and spindles, low pulley and belts, intaking sides of gears, couplings, protecting screws, nuts and similar moving parts of machines are best handled for protection by the machine builder.

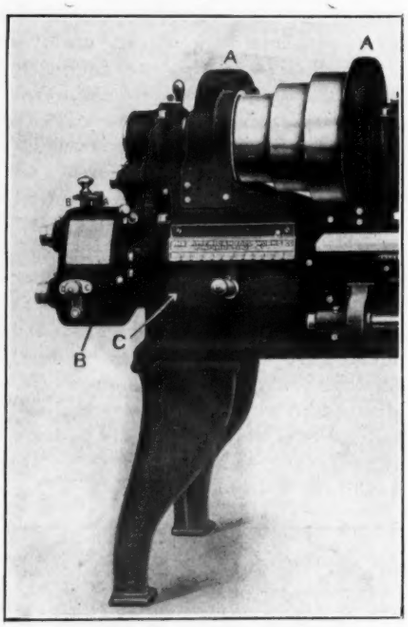


FIG. 6—A 16-INCH LATHE WITH GEARS FULLY PROTECTED

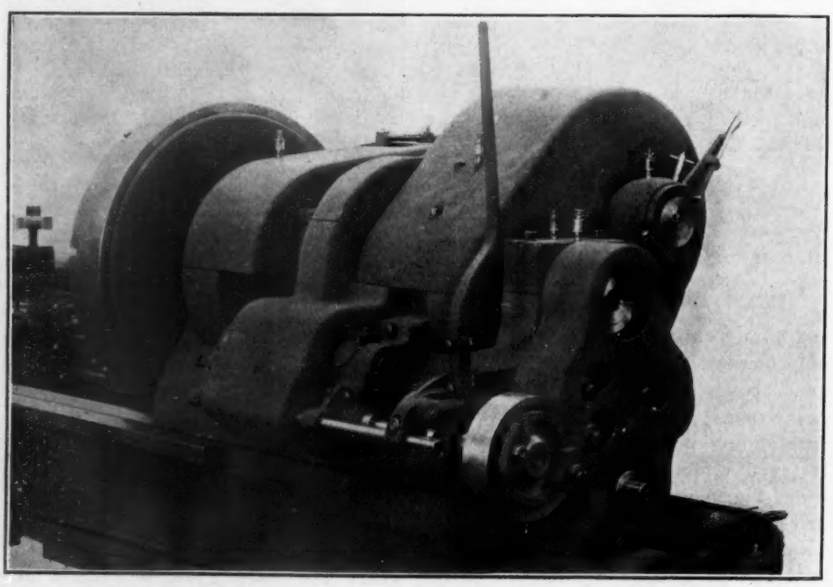


FIG. 5—ENGINE LATHE HEADSTOCK, SHOWING ALL GEARS FULLY PROTECTED

Electric Hoisting Machinery at Negaunee Mine

Work has been nearly completed on the installation of electric hoisting apparatus at the Negaunee mine of the Cleveland-Cliffs Iron Co., Negaunee, Mich. Considerable further work, however, remains to be done on the skips, guides, shaft house, etc. The permanent steel stockpile trestle, which is 2,000 feet long, has been finished, but the motors and cables for operating the cars are yet to be placed. Work inside the 899-foot shaft cannot be finished until the ice which formed in its walls is thawed. The guides for the skips and cages remain to be hung, and the wiring and piping has to be connected. The new buildings, some of which were started two years ago, have all been completed. The hoist-

ing machinery was manufactured by the Westinghouse Electric & Mfg. Co., Pittsburgh. Work was started on its installation about the middle of last November.

The Equipment

The group consists of two hoisting sets, drum and motor, and a 690-revolution per minute motor-generator set which will furnish direct current for the hoist motors. The latter consists of an alternating current motor direct-connected to two direct current generators. Its regulation is effected by a 13½-ton flywheel which takes care of momentary changes in load.

The two hoisting drums, one for the cage and the other for the skip, are operated by direct current motors of 200 and 500 horsepower, respectively. The 500-horsepower motor is direct-connected to the drum, while

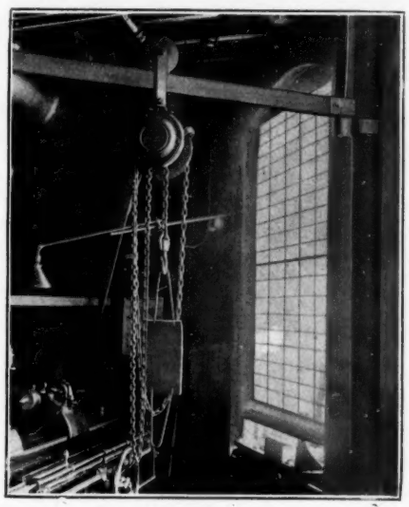


FIG. 7—JIB CRANE AND HOIST TO FACILITATE THE HANDLING OF WORK ON A GRINDER

the other is geared. Either hoist motor may be connected to either direct current generator in the motor-generator set and in case the current on the main line is suddenly cut off, the energy in the 13½-ton flywheel will continue to furnish power for hoisting men for a considerable period.

The hoisting drums are braked with compressed air and oil brakes. The brake shoe is weighted and when the air is applied, the stop comes gently, without jerk, because of the use of an oil pump in connection with the compressed air.

Safety Device

There is a safety device connected to the drums of the hoist, by which the motors are shut off and the compressed air brakes applied automatically, should anything happen to de-

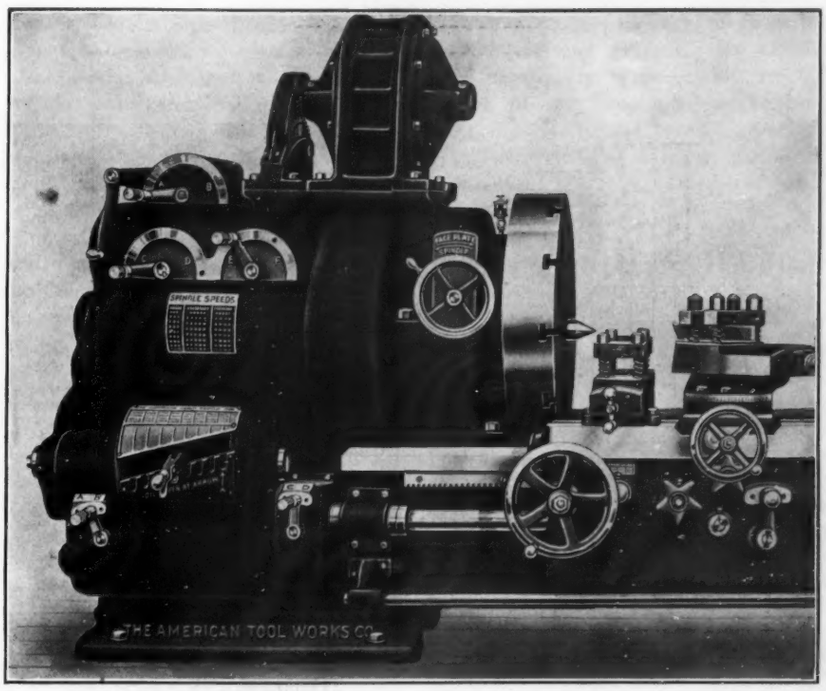


FIG. 8—HEAVY DUTY ENGINE LATHE WITH ALL GEARS ENCLOSED

prive the engineer of the control of his levers. In case the cages or skips are being hauled up and the engineer cannot get control when they reach the surface in time to stop them from raising to the top of the headframe and wrecking it, a safety wheel fitted with wooden cam, will, at the right time, actuate a lever, the movement of which shuts off the power. At the same time another lever will be acted upon by the cam, releasing the air, thereby applying the brakes to the drum. Both of the hoists are equipped with these safety devices. The electric system of hoisting, together with its instantaneous control, is considered so safe for mining purposes in Germany that it is lawful there in the coal mining regions to raise men to the surface at a rate of 2,500 feet a minute, while by steam

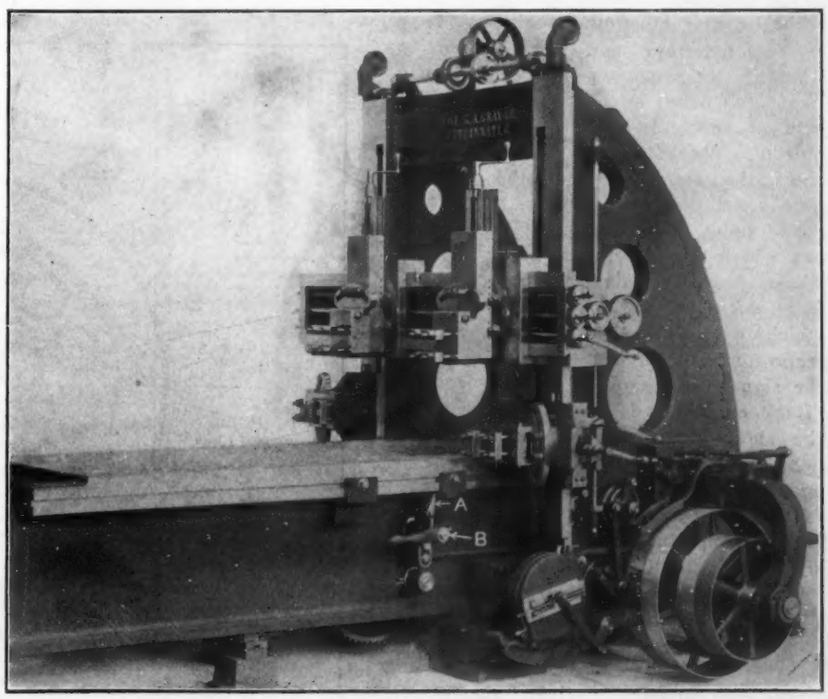


FIG. 9—SPUR GEARED PLANER, SHOWING SAFETY LOCKING PINS AND PATENT TRIP

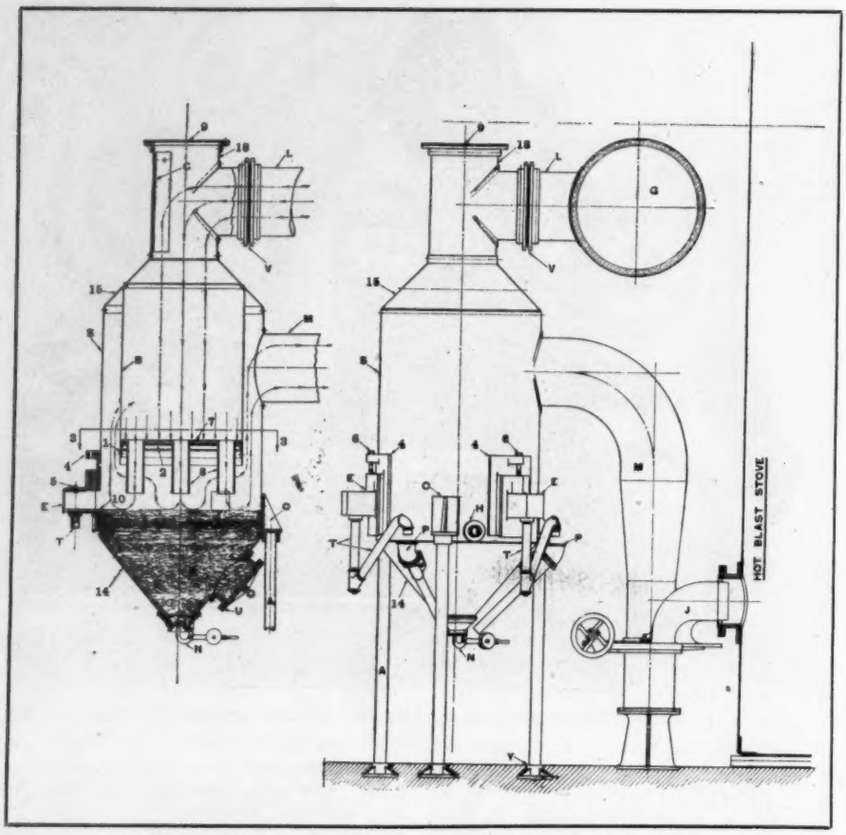


FIG. 1—SECTIONAL AND END ELEVATIONS OF GAS WASHER CONNECTED BETWEEN THE GAS FLUE AND BURNER

it is not lawful to hoist faster than 1,200 feet a minute.

A complete signal system, which will give three records of the signal rung from any level of the mine at one time, is another safety device which is being installed in connection with the new hoisting machinery. It is a gong, tape and light system, whereby the engineer not only has two signals, but a record of the signals of the entire shift. When the button is pressed in the shaft, a gong rings the signal, and at the same time a set of electric magnets punch round holes in a ¼-inch strip of paper which unrolls like a ticker tape. These holes remain in position in front of a powerful projecting lens, which, with the aid of mirrors, projects spots of light corresponding to the signal on a ground glass in front of the engineer. If he is not sure of the signal as he hears it from the gong he has only to look at these spots of light which remain constant until another signal is rung. The tape is rolled up automatically with each signal.

Gas Washers Applied to Individual Hot Blast Stoves

The advantages of clean gas for heating hot blast stoves are fully appreciated by blast furnace operators, but it is not always possible to obtain it on an economical basis. The cost of installation, maintenance and operation of gas washing plants is usually considered prohibitive except where the gas is required for direct power. In installations in which the gas is delivered from a central unit to the stoves absolutely clean, usually only a portion of the gas generated is washed, which is used for the gas engines and stoves. A large amount of the gas is allowed, under such conditions, to pass uncleaned to the boilers, as the expenditure for additional apparatus for cleaning it for use as a fuel is not generally considered an economical investment.

For the purpose of cleaning gas economically for hot blast stove use only, a method of applying the Mullen gas washer to individual stoves has been evolved by John Ruddiman, 227 Front street, New York City. These individual washers, in design, closely resemble the original Mullen type, but are necessarily modified to adapt them to this service. Their application to individual stoves is a recent development which will permit of the general installation of gas washers at blast furnace plants.

One of the advantages claimed for the single stove installation, in addition to that of economy of operation, is the facility with which the washers may be cleaned. The gas can be shut off and any single unit isolated, permitting the workmen to clean the washer without interfering with the operation of the entire furnace plant.

The individual washers are located in the gas line between the gas flues and the gas burners, as shown in Fig. 1. The tube area of each washer is reduced to take care of one-twelfth of the volume of gas generated, and each is independent of the other units, one washer being provided for each

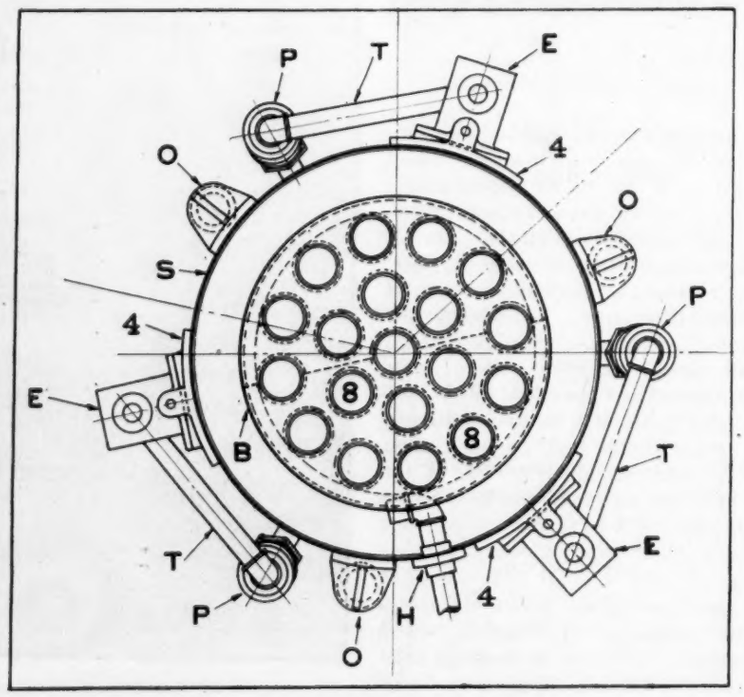


FIG. 2—SECTIONAL PLAN THROUGH THE WASHER ON THE LINE 3—3, FIG. 1.

burner. This washer is made in two sizes only. The smaller washer is 5 feet, 4⅛ inches in outside diameter and has 19 6-inch tubes. It is adapted for blast furnaces burning not over 610,000 pounds of coke in 24 hours. The large washer has a shell diameter of 6 feet, 10⅛ inches and has 37 6-inch tubes. This washer is designed for furnaces having a coke consumption greater than 610,000 pounds in 24 hours.

Either size may be reduced in capacity to conform to the actual coke consumption, by blanking the requisite number of tubes. The efficiency is maintained by adjusting the water level to conform with the velocity of the gas passing through the tubes. Fig. 1 shows a sectional and end elevation of the washer, and Fig. 2 is a sectional plan on the line *3—3*, Fig. 1.

The shell, *S*, is provided with a gas outlet, *M*, connecting the washer and the gas burner, *J*. Inlet pipe, *L*, connects the neck, *18*, and the gas flue, *G*, is provided with a plate valve, *V*. *C* is a wearing plate in neck, *18*. The conical lower portion, *14*, of the shell forms a chamber, *R*, for holding water and *N* is a valve through which the mud is flushed. The cylinder, *B*, depends from the top of the shell. A plate, *2*, is supported horizontally from an angle, *1*, near the bottom of the cylinder, *B*, and at *8* are shown pipes which depend from plate *2*, so that their ends are near the surface of the water. These pipes divide up the gas and cause it to impinge onto the surface of the water. The grouting, *7*, between the upper ends of the pipes, *8*, protects the plate, *2*. Three scum outlets or overflow ports, *10*, are arranged to hold the water level at the maximum distance from the end of the pipes, *8*. Saddle, *4*, having an opening slightly deeper than ports, *10*, is riveted to the shell. The inner end of the box, *E*, has an opening corresponding with that of the saddle, *4*, to which it is secured by bolts through slotted holes in the flanges of the box; *6* is a brass bolt for adjusting the box to any height within the limit of 4½ inches, at which point the water level will be raised to within 2¼ inches of the ends of the pipes, *8*, when in the position shown in the sectional elevation, Fig. 1, the water level will be within 6¾ inches of the ends of the pipes, *8*, thus providing for the variable velocity of the gas; *5* is a hand-hole provided with a suitable cover, and *T* is a gooseneck attached to box *E*, forming a gas seal, and conveys the overflow and scum to waste pipe, *P*. This adjustable overflow box was designed to increase the capacity of the gas washer, and to provide against the excessive velocity of the gas through the pipe, *8*. The head, *9*, is bolted to neck, *18*, the latter affording passage to the inner chamber, *B*, while entrance to chamber *R* is through manhole *U*. Brackets, *O*, and bases, *Y*, are cupped to receive 4-inch standard pipe columns, *A*, which support the washer.

In operation, the gas enters the chamber, *B*, where it expands and is discharged against the surface of the water at a suitable velocity, through the pipes, *8*. The clean gas passes between the pipes, *8*, into the annular chamber

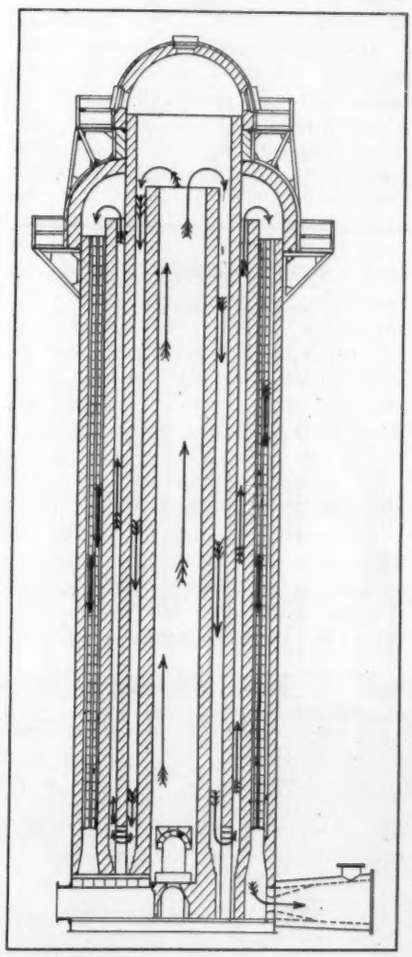


FIG. 1—VERTICAL SECTION OF A HOT BLAST STOVE, SHOWING NEW ARRANGEMENT OF FLUES

formed by the cylinder *B*, and the shell and is discharged through the outlet pipe, *M*, which conveys it to the burner. The arrows show the course of the gas from the inlet pipe through the washer. The dust settling in the water is flushed out periodically at *N*. The gas carries the scum on the surface of the water toward the outlets, *10*, by the aid of the rotary motion of the water imparted to it by the supply. The scum is carried off continuously with the overflow by the pipe, *T*, to waste pipe, *P*.

If it is found necessary to enter the washer for any purpose, this can be done without interfering with the operation of the furnace when the blast is on, by closing the valve, *L*, opening valve, *N*, removing head, *9*, and manhole cover, *U*.

An Improved German Hot Blast Stove

The present method of heating the blast in Cowper stoves entails the consumption of 40 to 50 per cent of the gas liberated in the blast furnace and the efficiency of the stoves is not more than 50 or 60 per cent, owing to the loss of heat by radiation from the stoves themselves and in the stack. The gas passes from the stoves while still at a temperature of at least 400 degrees Cent. The losses by radiation, states the *Iron and Coal Trades Review*, also prevent the temperature of the blast from being raised above 800 to 850 degrees Cent., although the calorific power of the blast furnace gas is sufficient to enable combustion temperatures of 1,400 to 1,500 degrees Cent. to be obtained even with cold air. Another difficulty resulting from radiation losses is that the amount of heat stored up in the stoves above temperatures of approximately 800 degrees is so small that the temperature of the blast is reduced at least 100 degrees Cent., even when the stoves are worked for only an hour at a time.

To reduce these heat losses, the Deutsche Huttenbaugellschaft, Dusseldorf, Germany, has introduced a modified stove, which, it is claimed, will work with a smaller consumption of blast furnace gas, while furnishing a higher and more uniform blast temperature. To obtain these advantages, the system of lining the stoves has been modified, the heating flues being arranged concentrically after the method proposed by Dr. Lurmann, some years ago, and since extensively applied in the United States. The loss of heat by radiation is reduced by locating the parts raised to the highest temperatures, in the center of the stove. To accomplish this, masses of material are provided in the center of the stove so that large quantities of heat at a high temperature can be accumulated there.

In other devices, to which this principle has already been applied, the inner shafts have been surmounted by a common dome supported by the cylindrical shafts, but as these latter cannot be stayed sufficiently to withstand the stresses set up by the dome under changes of temperature, they were liable to crack, thus allowing the blast and

the heating gases to make a short cut to the stack.

As shown in the vertical cross-section, Fig. 1, this defect has been remedied by extending the inner dome so that it is supported directly by the steel work of the stove. The inner shafts then carry only their own weight and can expand freely in an upward direction as the temperature increases without cracking the brick work. In contrast with the ordinary Cowper stove, the heating gases flow upward and downward twice through the full height of the stove. Similar to the American type of hot blast stove, the checker work is arranged in an external annular flue, the cooler portions of the stove being located next to the outer wall, thereby diminishing heat losses by radiation. The complete elimination of lateral pressure strains permits more porous brick of greater insulating power to be used.

While a considerable loss of heat, owing to the high temperature at which the heating gases pass into the stack, seems inherent to all brick stoves, experiments have shown the possibility of utilizing this waste heat by means of an iron preheater for the cold blast, located between the stove and the stack. This device is illustrated in Fig. 2. It consists of a series of thin wrought iron pipes having a total sectional area commensurate with that of the blast main, so that no appreciable loss of pressure is sustained by the blast from this cause. The efficiency of the heating surfaces of these pipes is maintained by frequently removing the dust deposited by the heating gases. The use of this economizer enables the temperature of the effluent gas to be reduced to about 200 degrees Cent., and the blast, when it reaches the stove has been raised to a temperature of about 250 degrees Cent. In this way the duty imposed upon the stove is reduced about one-fourth, thus making up for the reduced heating surface that inevitably results from the new method of lining the stove. A simple calculation shows that the consumption of gas for heating the stove is reduced by about 25 per cent in consequence of the increased utilization of the calorific power of the gas and the diminished losses by radiation.

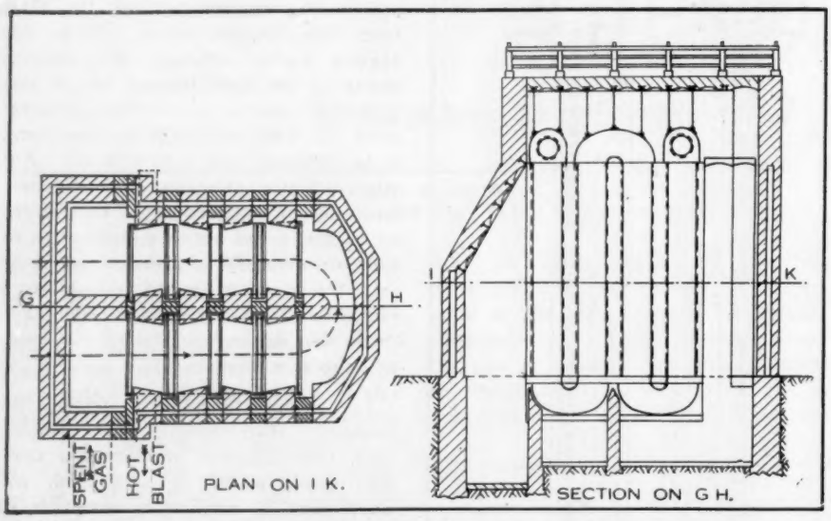


FIG. 2—PLAN AND VERTICAL SECTION OF AN IRON HEATER IN WHICH THE COLD BLAST IS PREHEATED

Hardening Steel by Infusion

Interesting results in the hardening of iron and steel are being obtained by the so-called infusion method, which is practically an extension of the case-hardening process. The principal difference between the infusion and case-hardening process is in the carbonizing material employed. It is claimed that the carbonizing action proceeds to a greater depth by the infusion method than by case-hardening, and the change from the treated to the untreated parts of metal sections is very gradual. The infusion process is applied only to formed parts. After machining, the pieces to be treated are packed with the hardening mixture, the composition of which is varied according to the effect to be produced. The box is then subjected to predetermined temperatures for periods of from one to four hours, according to the extent of the treatment. Upon removal from the furnace, the finished articles are quenched either in water or in oil.

It has been found that not only carbon, but other elements in modern alloy steels may be introduced into soft steel in this manner, and all of the difficulties of machining high carbon steels are eliminated, since the infusion is effected after machining This permits the process to be applied to a wide variety of articles, such as to small tools, including taps, dies, drills, reamers and milling cutters of all kinds. It also is available for machine parts, such as gears, cone and roller bearings, spindles, etc., and for numerous parts of agricultural implements, automobile parts and railway machinery.

A steel hardening compound for application by the infusion method is being manufactured by the American Infusion Steel Process Co., 60 Broadway, New York. The company has established a new plant in the Bush Terminal, Brooklyn, for the manufacture of this material, and for the treatment of steel articles by this process. The manufacturing facilities include a milling plant, which has a capacity of producing eight tons of compound daily. This plant consists of storage bins, elevators for transferring the material, mills for rough grinding and for pulverizing and mixing. The mixing is accomplished mechanically, which insures an absolutely uniform product.

The treatment department is equipped with 10 furnaces, varying in size of fire chamber from 18 to 52½ inches square. The furnaces are provided with pyrometers and are heated by fuel oil, which is supplied to the burners at a constant pressure by electrically-driven pumps. The atomizing medium is dry steam and every precaution is taken to separate any entrained water before using. Equipment is provided for quenching by both water and oil and for hot soda washing for cleansing the material after oil quenching. Overhead trolleys handle the material to and from the furnaces. In addition to these trolleys, especially designed trucks are used, which in themselves constitute movable extensions of the furnace hearths and facilitate the charging and discharging of the furnaces. The water for quenching is maintained at a low temperature and the oil is cooled by coils on the roof of the building, protected by hoods provided with louvres. The oil is slowly circulated through the coils by electrically-driven pumps.

The American Automobile Co., at New Albany, Ind., has been placed in the hands of a receiver on a petition filed by stockholders, and the New Albany Trust Co., of that city, has been appointed by the circuit court to act in that capacity. The assets are estimated at $200,000 and the liabilities at $49,000. It is stated that the company suffered from lack of working capital.

Gray Iron Foundry Operating Economies

How the Use of Labor-Saving Machinery Has Reduced Producing Costs in the M. Rumely Co.'s Plant

By H. Cole Estep

When the history of foundry practice in the United States covering the period between 1850 and the present time is written, it will be the duty of the historian to point out the intimate relationship between the progress of gray iron practice and the development of the agricultural implement industry. It might even be stated that the enormous demand from implement makers for large quantities of intricate gray iron castings of all sizes has been a potent factor in the development of the modern gray iron shop. It is only natural, therefore, that many of the most highly developed gray iron foundries in the country are operated in connection with plants manufacturing agricultural machinery. The new foundry of the M. Rumely Co., La Porte, Ind., is one of the latest and most advanced shops of this class and has many features of noteworthy interest.

The Rumely foundry is notable for its refinement of detail, both in physical equipment and in organization and methods. It is one of a rapidly increasing group of plants which have been designed by men sufficiently familiar with the science of foundry administration to appreciate the advantages of a careful layout and the use of the latest labor-saving devices. Throughout the shop, from the storage yard where pig iron and scrap are handled by lifting magnets, to the cleaning room, which is equipped with special cranes and dust-collecting bins, elaborate mechanical appliances have been installed to take the place of hand labor. Most of the molding, including that for castings weighing a ton or more, is done by machine and even for the smallest castings none of the iron is carried or poured by hand. It is not, however, the abundance or cost of the mechanical equipment which makes this foundry notable, but the judicious manner in which the machinery is disposed and utilized. The designer of the plant has endeavored to place each crane, molding machine or elevator in its proper place, where it will be made to contribute most to the productiveness of the shop. The heavy investment required to completely equip a large modern foundry involves a serious fixed charge which makes it imperative that the plant be designed to get the utmost out of its equipment and that a high order of intelligence be employed in its operation.

The M. Rumely Co. manufactures kerosene and steam-driven traction engines, separators, threshing machines, cultivating machines, etc. The castings vary from large crank cases weighing 1,800 pounds each to small engine parts averaging over a thousand to the ton. They are all made in the new foundry, which was designed for an output of 100 tons per day.

The building is a concrete and steel structure, 320 feet long and 220 feet wide, divided into five bays numbered for convenience in reference, as shown in Fig. 2. Work on the building was started June 7, 1910, and was completed Dec. 15, 1910, which is thought to be a record for rapid construction. The main bay is covered by a gabled monitor roof, and over each of the two side bays is a single gable roof supported by a row of posts in the center. The cupolas and charging floor are situated at the east end of the main bay. Bay No. 4, Fig. 1, on the south side of the shop, is devoted

FIG. 1—SOUTH BAY OF THE FOUNDRY, SHOWING MACHINE-MOLDED SNAP FLASK WORK

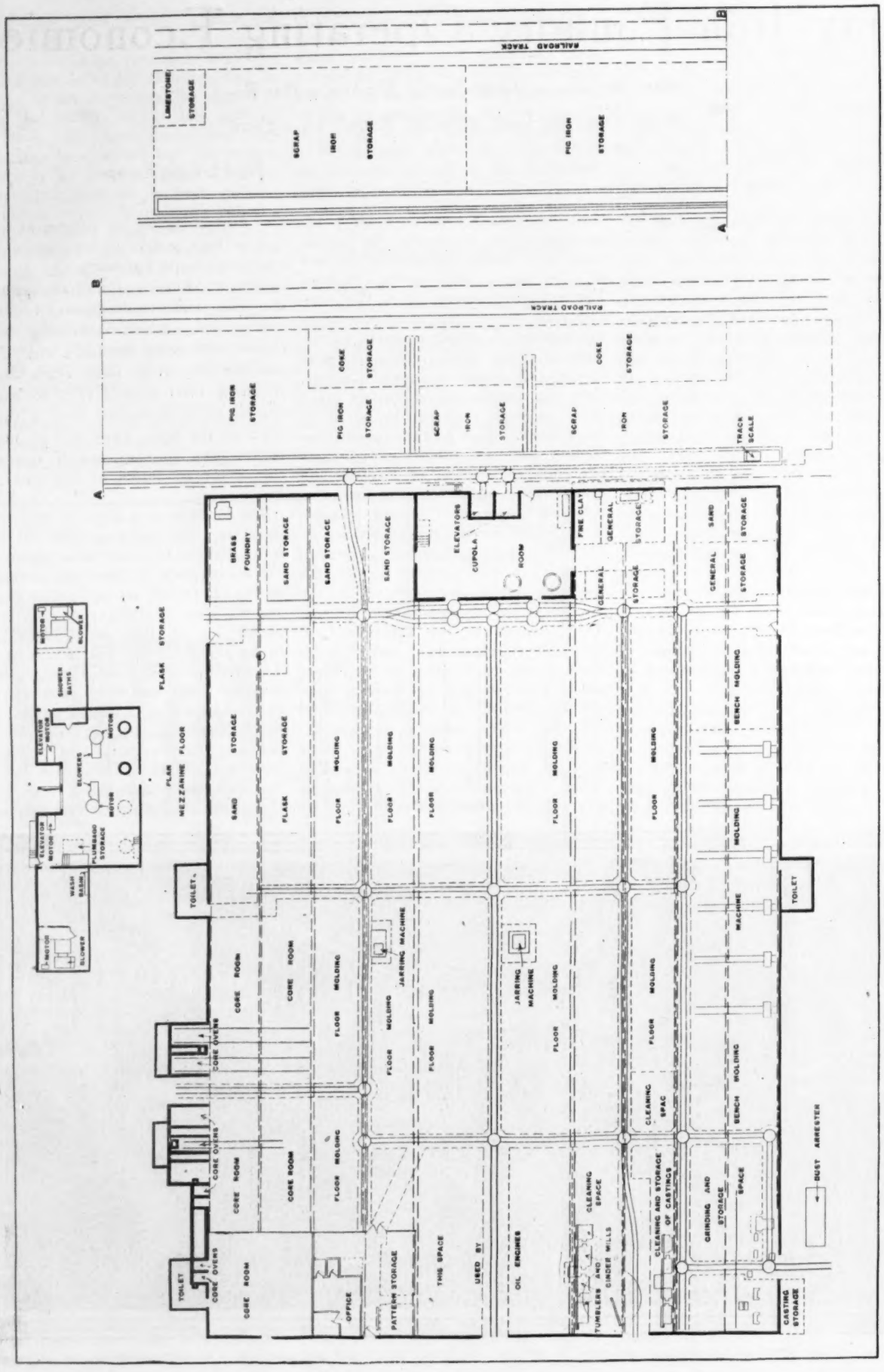


FIG. 2—ARRANGEMENT OF THE M. RUMELY CO.'S NEW FOUNDRY AT LAPORTE, IND., WHICH ALSO SHOWS A GROUND PLAN OF THE CHARGING AND MEZZANINE FLOORS

FIG. 3—GENERAL VIEW OF THE MAIN BAY OF THE FOUNDRY

to bench molding and snap flask work on machines; bays Nos. 2 and 3 are used for light floor and machine molding; heavy floor and jarring machine work is done in the main bay, No. 1, and the core department occupies bay No. 5 on the north side. In designing the shop the old foundry, which had a capacity of 20 tons per day, was taken into consideration and it was found that it required 700 square feet of floor space per ton of output daily. This included the molding floor only.

As continuous melting was to be practiced in the new foundry, it was decided that some of the molding floor could be used more than once the same day, by shaking out the molds that were poured early and ramming the flasks again in the same place, this being made possible by the extensive use of molding machines. The total area of the molding floor was, therefore, fixed at approximately 36,000 square feet.

Practically all of the snap flask work is machine-molded and the details of this process form one of the most interesting features of the operations of the shop. Tabor squeezers, Fig. 8, provided with patterns mounted on plates, are employed. Six machines are installed in bay No. 4, a general view of which is shown in Fig. 1. As indicated in Fig. 2, and shown in more detail in Fig. 8, each machine is mounted on a low car or truck which operates on a track laid across the floor. The molding

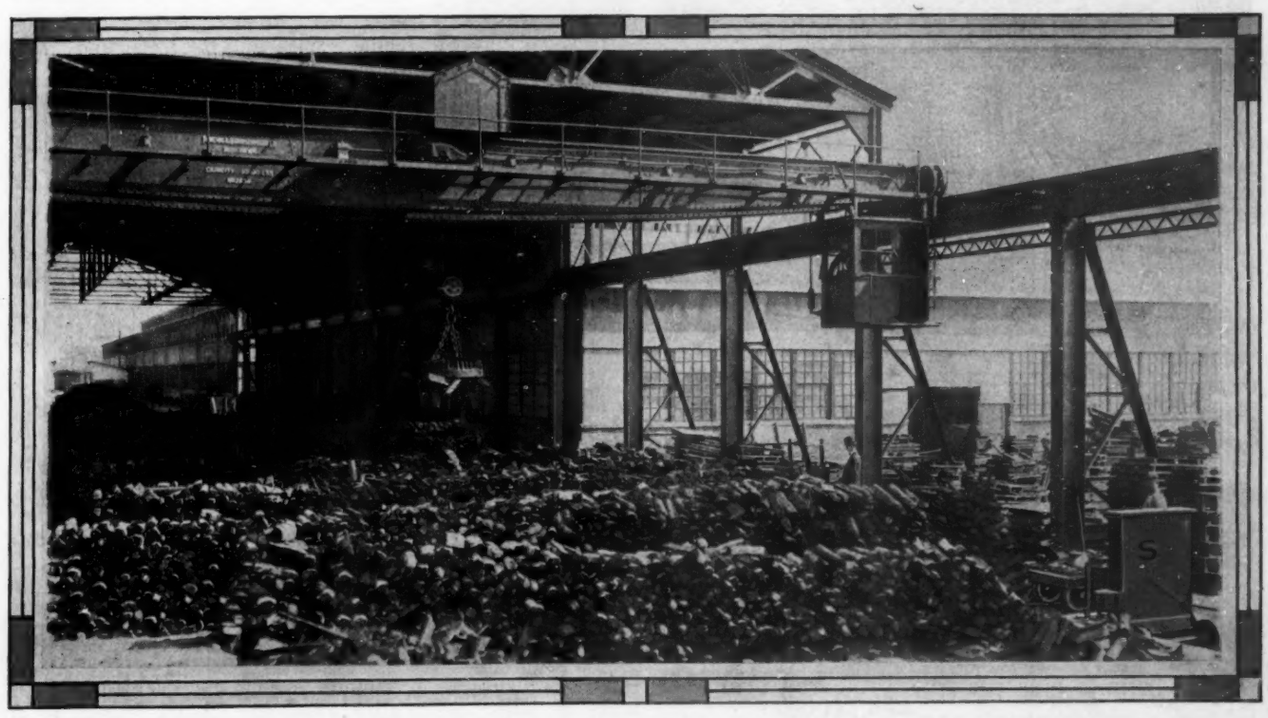


FIG. 4—THE PIG IRON AND SCRAP STORAGE YARD

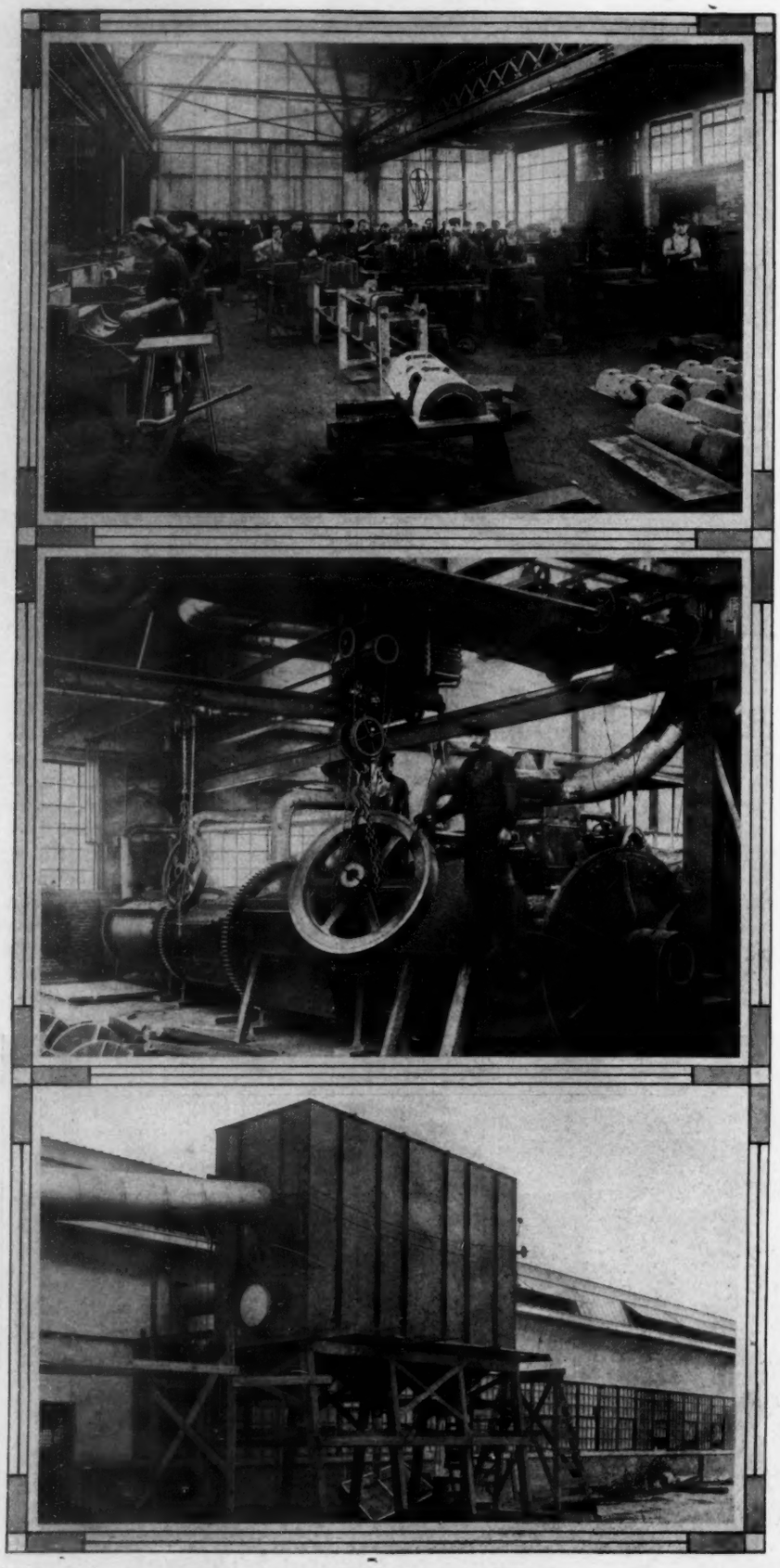


FIG. 5—A CORNER IN THE CORE ROOM

FIG. 6—CLEANING ROOM, SHOWING THE SMALL TRAVELING CRANES USED FOR LOADING AND UNLOADING CASTINGS

FIG. 7—DUST BINS FOR COLLECTING THE DUST FROM THE TUMBLERS AND GRINDERS

sand is piled parallel to the track. When he commences his day's work, the molder draws the machine back to the outer end of the track and as the sand is used, moves it gradually toward the wall. The finished molds are laid in the space left by the removal of the sand. The molder takes no unnecessary steps and is able to work a great deal faster than if the machine were stationary. The man at the machine in Fig. 8, with only three weeks' experience, made molds, similar to those shown, at the rate of 16 per hour. There were two small castings in each mold which required no core setting.

Medium heavy work, such as pulleys, are molded on Pridmore stripping plate machines, as shown in Fig. 10. This class of work is put up in neat, specially made, round, cast iron flasks. Attention is called to the cast taper lugs on the flasks shown in Fig. 10. Making 15-inch pulleys on machines similar to the one shown, an average production of 55 molds per day is obtained.

Jar-Ramming Machines

Two jarring machines are installed at points indicated in Fig. 2. The larger one in the main bay, Fig. 9, is a 24-inch cylinder Norcross machine used for making crank case, fly wheel and other heavy molds. In this illustration a crank case mold is shown on the machine. This casting weighs 1,800 pounds. Three molders and two helpers are employed for making the mold, which is completed in about two hours. Both copes and drags are rammed on the jarring machine. Without the machine, two molders and a helper were formerly employed an entire day on a single mold. One molder and a helper formerly made by hand one fly wheel mold, about 4 feet in diameter, per day; now one molder and three helpers make five per day on the machine. The smaller machine in bay No. 3 was built by The Tabor Mfg. Co., Philadelphia. It has an 8-inch cylinder and is used for medium heavy work.

Large gears are molded from solid patterns by hand in circular flasks, similar to those in the foreground in Fig. 3. The cope halves of the gear patterns are mounted on boards and are drawn from the sand by the crane; the drag patterns are drawn by hand. The gears are rammed by hand.

Each molder pours his work from a 700-pound crane ladle, but is not required to shake-out flasks or cut-over the sand. It requires about seven minutes to pour out a ladleful of iron, after which the molder returns to his

work. The shop operates on a 10-hour daily schedule and practically all the work is paid for on a piece rate basis. The piece rates are fixed by the foundry superintendent after careful study and comparison. Great care is used in fixing rates to arrive at equitable figures.

Foundry Instructor

Each of the four molding bays is under the supervision of an instructor, who is a man of wide foundry experience. It is his duty to show the men short cuts and proper methods of doing work and to aid in every way toward getting a maximum production with least effort. It is also the duty of the instructor to route the work in his department so that each man will be kept busy at the kind of work for which he is best adapted and to check up the production and progress of orders in his department. Thus, as far as organization is concerned, there are four small shops instead of one large foundry and each department thereby receives the personal attention which it is possible to give to a small shop. The foundry superintendent, of course, has general supervision of all departments.

At present the plant is melting about 70 tons daily, and employs 235 men, 65 of whom are molders. This gives an output of 1.08 tons per molder per day. The men are hired without regard to previous experience. New men are recruited from the smaller towns or from farms, as far as possible.

The pig iron, scrap and coke storage yard lies east of the foundry with its long axis perpendicular to the main axis of the shop, as shown in Fig. 4. Just east of the plant is a small prairie lake and the ground on which the shop is built is artificially filled. The building columns are placed on concrete footings which in turn rest on piles, as shown in Fig. 13. This illustration also shows the details of the roof trusses, windows, walls, and other structural features of the building. The columns throughout the shop are spaced 20 feet, center to center. In the old shop they were 16 feet and this proved insufficient for convenient operation. The walls are brick to the window sills and reinforced concrete above the windows. The monitor walls are also reinforced concrete while the roof consists of concrete slabs laid on steel purlins. The windows have steel sashes. Approximately 40 per cent of the wall space and 30 per cent of the roof is glass.

The shop is heated by direct radiation from steam coils and also by hot

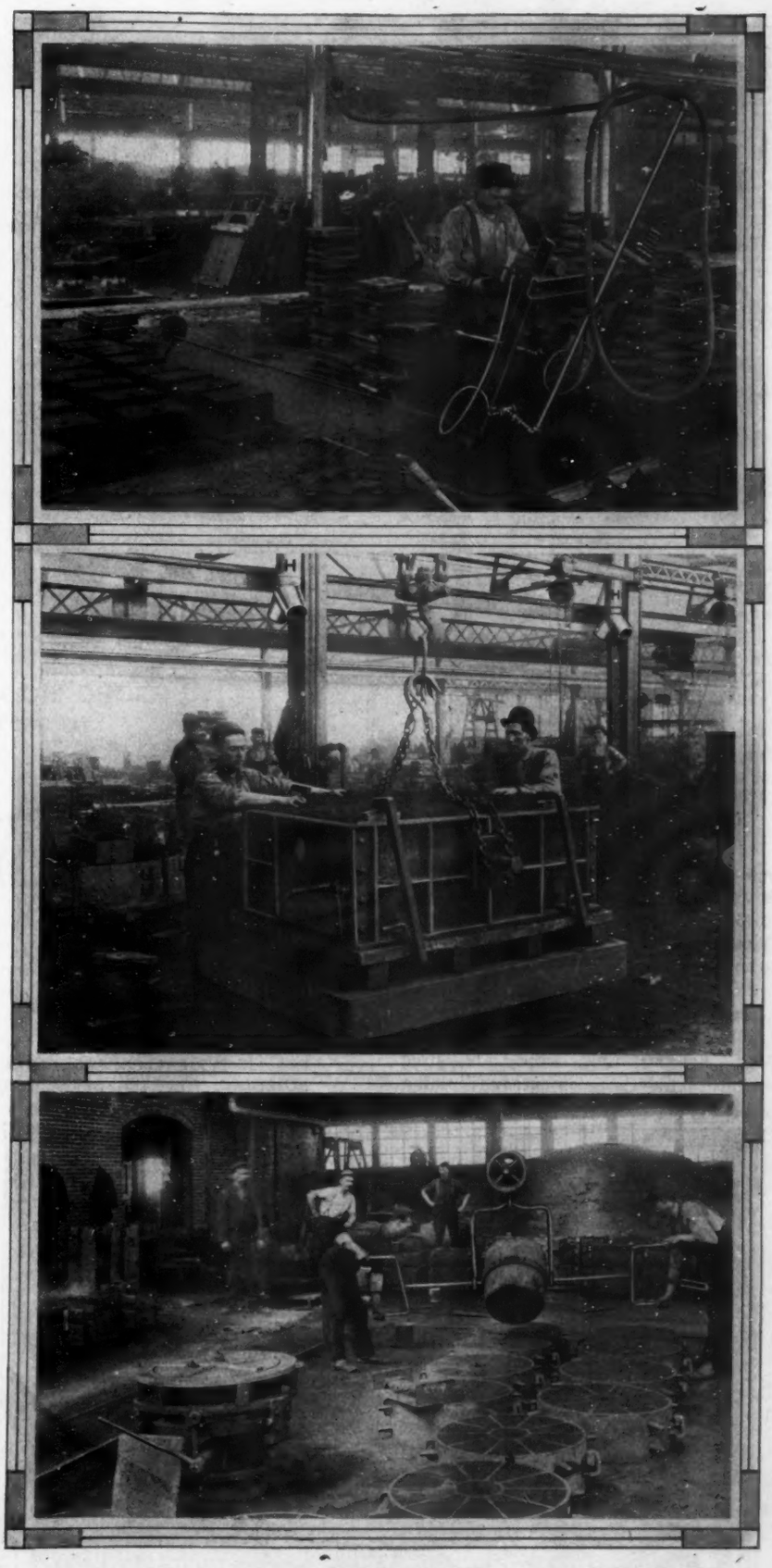


FIG. 8—ONE OF THE SQUEEZERS MOUNTED ON A TRUCK, WHICH OPERATES ON A TRACK

FIG. 9—ONE OF THE JAR-RAMMING MOLDING MACHINES, SHOWING A CRANK CASE MOLD ON THE TABLE

FIG. 10—STRIPPING PLATE PULLEY MOLDING MACHINE AND THE METHOD OF POURING PULLEY MOLDS

FIG. 11—ARRANGEMENT OF THE CUPOLAS, SHOWING ONE OF THE LADLE TRUCKS AND THE TRACKS FOR HANDLING THE HOT METAL

air distributed through the ventilating system. The steam coils are located above the crane rails and two of the hot air outlets are shown at H, Fig. 9. In the summer cold, fresh air is delivered through the ventilator system.

Artificial light is supplied by flaming arcs hung 40 feet above the floor in bay No. 1, and 15 feet above the floor in the side bays. In the main bay the lamps are provided with deep, concentrating reflectors, while those in the side bays have flat, diffusing reflectors. Each lamp illuminates approximately 2,400 square feet of floor. Six-ampere, regenerative, flaming arc lamps are used. There is no supplementary illumination except in the core room, where a 16 candle power incandescent lamp is hung over each bench. The most suitable type of illuminating units and their proper spacing were determined by test and comparison. Experiments were made with various kinds of lamps in a smoky atmosphere similar to that which often exists in a foundry and the yellow beam from the flaming arc appeared to be the most penetrating.

Air compressed to 90 pounds per square inch at the main power plant of the works is supplied in abundance to all parts of the shop for the operation of various pneumatic machines. The air lines are carried between the crane rails and the posts at the side of each bay and branches are tapped in every few feet as shown at *B*, Fig. 1.

The storage yard, Fig. 4, is at the east end of the plant just back of the cupolas. The yard is 73 feet wide and 500 feet long. A portion of the yard, 300 feet in length, nearest the shop, is covered by a gable roof. The roof is not absolutely necessary but the protection it affords makes it much easier to handle material in the winter. The yard is served by a 5-ton Pawling & Harnischfeger crane equipped with a lifting magnet for handling pig iron and scrap, installed by the Electric Controller & Mfg. Co., Cleveland. Along the east side of the yard extends a standard gage track over which cars loaded with material are switched in. On the west side, next to the shop, as shown in Fig. 2, is a narrow gage, sunken track equipped with a self-propelled electric scale car shown at *S*, Fig. 4. Parallel to the sunken track is a narrow-gage surface track, connecting with the industrial railway and the charging floor elevators. This is used for the storage of cupola

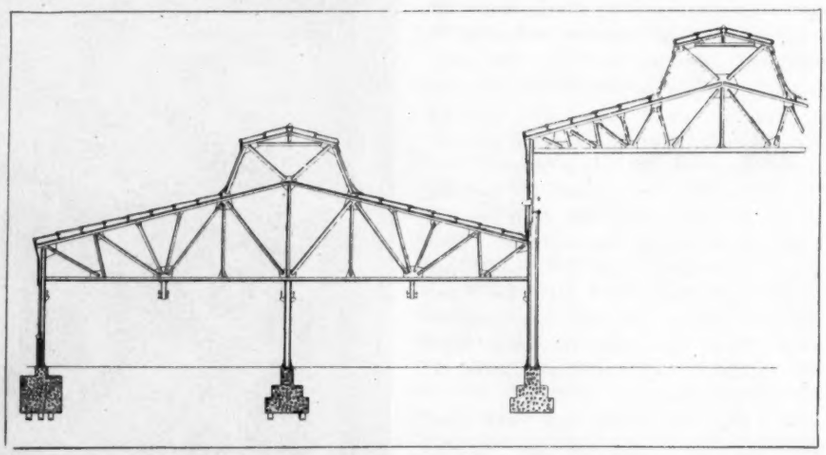


FIG. 13—TYPICAL CROSS-SECTION THROUGH PART OF THE FOUNDRY BUILDING, SHOWING STEEL SCRUCTURAL WORK AND FOUNDATIONS

FIG. 12—CHARGING FLOOR, SHOWING TYPE OF CHARGING BUGGY

charges, thus making it possible to use a smaller charging floor and preventing any trouble due to delays in delivering material to the cupolas during a heat.

The charging floor, Fig. 12, is 40 x 60 feet, supported on I-beams. A smooth, rigid surface is provided by a course of steel channels laid flange to flange, backs up. Good ventilation is secured by leaving open the front end of the floor facing the main aisle, protecting it only by a low guard fence, as shown. The elevators, two in number, are at the back nearest the storage yard. Each elevator is 8 x 8 feet, and of 5 tons capacity. Two cupolas are installed, each being 48 inches in diameter inside of lining. One was built by the Whiting Foundry Equipment Co. and the other by the Calumet Engineering Co., Harvey, Ill. One of the features of the cupolas is the height between the bottom plates and charging doors, which is 22 feet. A melting ratio of 9 to 1 is obtained. One cupola is run on gray iron and the other produces semi-steel.

Date____ Pat. No.____ Order No.____

Name of Casting____

Kind of cores in casting____ Wt.____

No. of cores in casting____

No. castings wanted____ Send to Dept. No.____

Molder____

Remarks____

Foreman____

The Foundry

FIG. 15—CLEANING ROOM ORDER

MOULDING ROOM ORDER

M. RUMELY COMPANY

Fdy. Order____

Material____ Patt. No.____

Name of Cstg.____

Pcs. wanted per day____ Del. to____

Remarks____

Sig.____

The Foundry

FIG. 14—MOLD ROOM ORDER

The gray iron mixtures are standard, made up by analysis. The semi-steel mixtures vary somewhat according to the work to be cast, but do not diverge far from the following, which has been found successful for ordinary work:

Steel scrap .....20 to 25 per cent
Selected No. 1 gray iron scrap 15 per cent
No. 2 pig iron .....65 to 60 per cent

The charges weigh 1,000 pounds each; larger charges have caused trouble in the operation of the cupola, particularly on semi-steel. The reason for this seems to be that the material melts unevenly unless charged in comparatively small quantities, so that it is thoroughly mixed. Steel does not melt like pig iron, but first becomes pasty before liquefying and if heavy rounds are charged the resulting metal at the spout will lack uniformity of composition. In making up semi-steel charges due account is taken of the influence of the coke on the bath, since the experience at this plant indicates that some of the carbon in the coke is dissolved in the metal. Mixtures have been charged that were calculated to give 2.25 per cent carbon, but an analysis showed 3.40 per cent in the metal at the spout. The inference is that the additional carbon is taken up from the coke.

The arrangement of the cupola spouts and the provisions for handling hot metal are shown in Fig. 11. A low brick wall protects the legs of the cupolas and keeps the heat and smoke from the drop, out of the shop. The iron is all poured into 2,000-pound truck ladles similar to the one shown at the right in Fig. 11. As fast as these ladles are filled they are switched onto the storage track parallel to the pouring track or run out on the track which extends down each aisle. From the truck ladles the iron is poured into 700-pound ladles which are picked up by the cranes and the molds are poured as shown in Fig. 10. No iron is carried by hand. This arrangement does away with the time-honored receiving ladle under the spout, but permits the iron to be poured cleaner, quicker and consequently, hotter. Each molder

M. RUMELY COMPANY

CORE ROOM ORDER

No.____

Patt. No.____

Make____ Cores from Core Box No.____

Clock No.____ Name____

DATE	CORES MADE	IMPERFECT		PERFECT	DUE	DATE	CORES MADE	IMPERFECT		PERFECT	DUE
		MAKER'S	CO.'S					MAKER'S	CO.'S		

Date____ (Sig.)____

The Foundry

FIG. 16—CORE ROOM ORDER

pours his own work. The fire in the cupolas is started by a torch burning crude oil under pressure, the burner being placed in the spout so that the flame is directed through the tap hole.

As indicated, the plant has unusually complete facilities for the transportation of materials. Each bay is provided with overhead traveling cranes and also with industrial tracks. The cars are all built with the wheel flanges running on the outside instead of on the inside of the rails and since the track is elevated slightly above the general level of the floor, there is no trouble in keeping the flangeways clear. With ordinary cars having flanges on the inside, constant work is necessary to keep the passage for the flanges clear, otherwise it becomes difficult to move the trucks and derailments are frequent. The trucks are all of the four-wheel variety and are pushed by hand, using one or two laborers as the case requires. Occasionally the tracks are sprinkled to settle the dust and aid in keeping the rails clean, and this is all the attention which they require. The molding sand, which is stored at the east end of bay No. 5, as shown in Fig. 2, is distributed in ½-yard buckets by means of the industrial railway, supplemented by crane service.

SYMBOL NUMBER

M. RUMELY COMPANY

FOUNDRY ORDER

ORDER No.

Cast_____ Name of Casting_____

DATE	PCS. CAST	DUE	DATE	DEP'T	PCS. DEL'D	TOTAL DEL'D	RECEIVED BY	SCRAP DATE	SCRAP PCS.	ON HAND

The Foundry

FIG. 17—FOUNDRY ORDER SHEET

In the foreground of Fig. 3 a load of sand ready to be picked up and dumped by the crane may be seen. The sand buckets are provided with bails for ease in crane-handling.

The central bay is equipped with a 57-foot, 7-inch span, 10-ton Pawling & Harnischfeger electric traveling crane provided with a 3-ton auxiliary hoist. This bay is also provided with I-beam jib cranes equipped with hand hoists and trolleys as shown at the right in Fig. 3. Each aisle in the side bays is provided with a 20-foot span, 2½-ton Whiting foundry crane, equipped with ground control. These cranes are used for a large variety of purposes. In Fig. 6 one may be seen unloading heavy fly wheels from the tumbling mills. This illustration also shows one of the 1-ton hand cranes which are used for light work in the side bays, supplementing the electric cranes. Fig. 10 shows how the 2½-ton Whiting cranes are used in pouring, handling 700-pound crane ladles.

Core Department

The west end of bay No. 5 is fitted up for coremaking. Five car ovens, 7 x 15 feet, and four shelf ovens, as shown in Fig. 2, are installed. The ovens are built outside the building and are fired from the outside. Approximately 8,700 square feet of floor area is reserved for coremaking, this department being 217½ feet long and 40 feet wide. The west end is partitioned off into a room 40 feet square, which is occupied by the women employes of the core department. Fig. 5 gives a good idea of the arrangement of the men's core department and of the kind of cores made. At the right in this photograph may be seen one of the oven cars with its notched posts for carrying adjustable shelves.

Form 333 FOUNDRY WEIGHMASTER'S REPORT

Date_____ 191_

SYMBOL	ORDER	NAME OF CASTING	PIECES	TOTAL WEIGHT	DEP'T

Sig._____

The Foundry

FIG. 18—FOUNDRY WEIGHMASTER'S REPORT OF CASTINGS DELIVERED

The cleaning room is across the shop from the core department. It is equipped with eight tumblers of various sizes arranged in a row as shown in Fig. 2. Fig. 6 also shows the tumblers and illustrates the methods employed for loading and unloading. The tumblers are gear-driven by a 10-horsepower motor. This department is also equipped with four grinders driven through a line shaft by a 30-horsepower motor. A 40-horsepower motor operates the fan in the dust collector system. As shown in Fig. 6, each tumbling mill and grinder is connected to the dust collector system by direct piping which discharges into the dust bins, Fig. 7, situated just outside the shop. These bins have hopper bottoms with suitable valves and chutes so the dust may be drawn off into cars and conveniently carried away.

The unusual height, 22 feet, between the cupola charging doors and bottom plates permits a mezzanine floor under the charging floor. A plan of this floor is given in Fig. 2. The central portion is used for storage and for the blowing machinery, which consists of two positive pressure blowers, interconnected, each driven by an individual 30-horsepower motor. The south wing of the mezzanine floor is fitted up with shower baths, while locker space and wash basins are provided in the north wing. The ventilating fans are also placed on this floor. The northeast corner of bay No. 5 is partitioned off and is fitted up for a small brass foundry, being provided with suitable molding machines and furnaces.

A number of simple forms have been devised for checking production and keeping track of orders. Orders for castings are received by the foundry from the production department on the sheet, Fig. 15, which contains columns for checking the pieces as produced and delivered, for keeping a record of spoiled pieces and is a receipt for all quantities delivered on the order. This form is kept in the foundry office.

Upon the receipt of an order on this sheet, the foundry clerk makes out department orders, one on the card shown in Fig. 16, for the core room, one on the card, Fig. 14, for the molding room, one on the card, Fig. 15, to the cleaning room, and one on a card for the pattern storage. These forms are largely self-explanatory. The core room order is issued in advance of the others, so there will be no delay in waiting for cores. The pattern order card contains a complete record of patterns and parts of patterns delivered on a

given order and when the patterns are returned they are checked against this record to be sure no pieces are lost. The cleaning room order, Fig. 15, shows the kind and number of cores in each casting and the department to which castings are to be delivered.

A record of every shipment of castings, showing order number, name of casting, number of pieces, total weight and department receiving castings, is kept by the foundry weighmaster on a sheet shown in Fig. 18. The record of pieces delivered entered on the sheet, Fig. 17, is made up from the weighmaster's reports.

Each molder is provided with a card, Fig. 19, which provides a complete record of two weeks' work, the interval between pay days. This record is kept by the instructor of the department in which the man works. The form is largely self-explanatory; a separate column, headed by the pattern number, is used for each different pattern. The pay roll is made up from these records.

The foundry superintendent keeps closely in touch with the progress of all orders in the shop, and also consults frequently with the heads of other departments and with the works manager in order to be familiar with the work which the foundry will be called upon to do. Since all production originates in the foundry, the machine shop and other departments being absolutely dependent on it for their raw material, the foundry superintendent at all times is familiar with the progress of orders throughout the entire factory.

Chicago Foundrymen's Club

The Chicago Foundrymen's Club has been organized by the members of the Chicago Foundry Foremen's Association and others not members of this organization, but interested in the advancement of the foundry industry. The club has been incorporated, and at a recent meeting of the Chicago Foundry Foremen's Association it was decided to disband that society. By the adoption of the term *club* the organization will not be confused with other foundry societies known as associations, and inasmuch as the club is not organized for business purposes, but for establishing more intimate social relations and to promote foundry educational work, the term is considered more appropriate. For the current year the dues are $5 for resident members and $3 for non-resident members. After this year the dues will be $3 for resident and $2 for non-resident members.

Officers of the association have been elected as follows: James Wood, president; H. O. Lange, vice president, and C. E. Hoyt, secretary and treasurer. The directors are A. M. Thompson, E. W. Smith, E. J. Welch, Wm. Pederson, J. G. Garrard, Wm. Breckenridge, Thorfin Mauland and Oliver Goldsmith.

Production of Pig Iron in Belgium

The pig iron output of Belgium in 1911 aggregated 2,106,120 tons. Of this total, 90,950 tons was forge iron, 51,070 tons foundry iron, and 1,964,000 tons basic and Bessemer pig. Contrasted with the output of the previous year, the production showed an increase of 302,620 tons, due entirely, as in previous years, to the increased output of basic and Bessemer pig. The production of forge and foundry iron decreased 111,020 tons, and the total increase of basic and Bessemer was, therefore, 413,640 tons. At the close of 1911 there were 44 furnaces in blast and six idle.

A Well Equipped Boiler Plant

The Hoosier City Boiler Mfg. Co., Indianapolis, advises that it purchased the plant of the Quinlan Boiler Co., which was completed last September. Its machinery and equipment is all of the latest type and includes 18-foot rolls, a flanging press to flange 84-inch heads, hydraulic riveters, steam hammers, forging machines, etc. The machinery is entirely equipped with electric motors. The furnaces are all oil-burning. J. M. Boucher, vice president and general manager of the company, is well-known and experienced in the boiler business, having been sales manager of the Brownell Co., Dayton, O., for many years.

RECORD OF MOLDS PRODUCED

Name Samuel Kezner Date April 10–24 No. 347

	PATTERN	264 D1			398 P4			216 D1																						DAY WORK	
	NUMBER OF MOLDS WANTED	300			20			1700																							
	WIEGHT PER MOLD	10			75			10																							
	PRICE PER MOLD	2½c			10c			2½c																							
		PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	PERFECT MOLDS	IMPERF'T MDPS	IMPERF'T CO'S	NO. OF HOURS	PRICE PER HR.
April	10	140	0	0																										
	11	140	10	–																										
	12	20	–	–	20	–	4																							
	13							141																							
	14							137	–	3																					
	15							147	4	–																					
	16	Sunday																													
	TOTAL MOLDS																														
	TOTAL VALUE																														
	DISCOUNT																														
	NET VALUE																														

The Foundry

FIG. 19—MOLDER'S DAILY RECORD OF MOLDS PRODUCED

The completion of the three new buildings of the Gould Mfg. Co., Seneca Falls, N. Y., was celebrated by a ball, given by the Gould Mutual Benefit Association, recently. The two new machine shops were decorated and a varied program carried out for the entertainment of the guests, of whom there were over 2,000. The proceeds went to the association, for the benefit of sick members.

New Catalogs

BOILER TOOLS.—The J. Faessler Mfg. Co., Moberly, Mo., has issued an illustrated folder devoted to its line of octagonal sectional expanders, roller expanders and flue cutting machines.

FLAKE GRAPHITE.—In an eight-page circular the Chester Graphite Co., Chester Springs, Pa., discusses the use of flake graphite as a lubricant. The circular contains numerous suggestions regarding the use of this material for lubricating purposes and the varied applications of this material also are outlined.

REINFORCED CONCRETE CONSTRUCTION.—C. A. P. Turner, consulting engineer, with offices in Minneapolis and Winnipeg, has issued bulletin No. 12, which is devoted to the Turner mushroom method of reinforced concrete construction. In this bulletin the numerous recent failures of reinforced concrete structures are attributed to faulty design. The bulletin contains numerous illustrations of reinforced concrete buildings which have been built according to the Turner mushroom system.

GAYLEY DRY BLAST.—Frank C. Roberts & Co., civil engineers, Real Estate Trust Co. building, Philadelphia, in a 16-page circular briefly describe and illustrate plans of Gayley dry blast plants which they have designed and built. These include the dry blast plants of the Warwick Iron & Steel Co., Pottstown, Pa.; E. & G. Brooke Iron Co., Birdsboro, Pa.; Cardiff works of Guest, Keen & Nettlefolds, Ltd., Cardiff, Eng.; Pioneer Iron Co., Marquette, Mich., and the Steel Co. of Canada, Hamilton, Ont.

DROP FORGINGS.—H. D. Smith & Co., Plantsville, Conn., have issued a catalog devoted to their extensive line of drop forgings. While making a specialty of vehicle forgings, this concern also manufactures special drop forgings and small drop-forged tools. The latter include nail sets, cold chisels, cape chisels, pincers, screw drivers, wrenches, hammers, drawing knives, hatchets, etc. The catalog contains complete dimension and price lists and is handsomely illustrated.

CRUCIBLES.—A 16-page booklet devoted to crucibles and other graphite products, which also contains a list of prices, has been issued by the Joseph Dixon Crucible Co., Jersey City, N. J. A list of standard sizes of crucibles is included, as well as general hints for the use of graphite pots in coke-fired and oil-burning furnaces. An interesting description is given of bottom-pour crucibles, which can be used to advantage for castings requiring unoxidized metal. Descriptions and prices of crucibles, crucible covers, stirrers, skimmers and dippers, retorts, etc., are included.

PIPING MATERIALS.—A 395-page catalog issued by the Best Mfg. Co., Pittsburgh, is devoted to the extensive line of piping materials for steam, air and hydraulic work, manufactured by this company. The material for these high pressure piping systems includes valves, fittings, flanges, pipes and pipe bends, separators, etc. This company also makes gray iron castings up to 50 tons in weight. The catalog can almost be considered a handbook, as it contains much valuable data for the steam and hydraulic engineer. The various products are illustrated and dimensions and prices are included.

VERTICAL AIR COMPRESSORS. — The Gardner Governor Co., Quincy, Ill., has issued a bulletin devoted to its line of vertical high speed, air compressors. These machines are simple in construction, require no outside adjustments and are dust-proof. The lubrication is automatic, the light valves insure quiet seating and noiseless running and the connecting rods are all fitted with interchangeable, die-cast bushings which are easily renewable. Because of its light weight, the compressor is especially recommended for use in portable units. The bulletin contains numerous illustrations showing the various models in which this compressor is manufactured.

ELECTRIC FANS.—The General Electric Co., Schenectady, N. Y., recently issued its 1912 catalog of electric fans. The publication is attractively printed in colors and contains descriptions and illustrations of fans manufactured for use in the home, office, etc. The line comprises fans suitable for desk or table use, manufactured in fan diameters of eight, 12 and 16 inches. These fans are convertible without the use of tools or additional parts and may be used on a horizontal surface or attached to a wall. They are made in two styles, fixed and oscillating. In addition, the publication contains illustrations and descriptions of the General Electric line of ceiling and column fans.

HIGH SPEED CHAINS. — The Morse Chain Co., Ithaca, N. Y., has issued a catalog describing and illustrating its line of silent running, high speed chains for the transmission of power. These chains are designed on the flexible rack principle and are provided with teeth which keep automatically in contact with the wheel sprockets. They engage the sprocket wheels over large arcs of their circumferences, the resulting pressure on each tooth being much less than that created in the use of gearing. These transmission chains are particularly recommended for use where short center distances between shafts are desirable. The catalog contains interesting data on the first cost and up-keep expenses involved in the use of chain drives.

IRON, STEEL AND METALS. — The Arthur C. Harvey Co., Boston, has issued the second edition of its catalog. The present volume is cloth-bound, 8½ x 11 inches, contains 190 pages, and, in addition to the lines previously carried by this concern, lists a number of new lines recently added to its stock. The catalog contains standard classifications of extras and tables of weights and comparisons of gages of the various lines of iron, steel and metal products carried in stock. These include a full assortment of iron and steel finished products, machinery steel for various purposes, structural steel, reinforcing bars, Norway and Swedish iron, tool steel, roofing material, sheet copper, solder and metals, tinners' tools, bolts and screws, machinists' tools and supplies, horse shoes, nails, etc.

REGRINDING VALVES.—A bulletin recently issued by the National Tube Co., Pittsburgh, is devoted to the "N. T. C." type of regrinding valve manufactured by that concern. These valves are made in globe and angle, as well as horizontal check and angle check patterns, and vary in size from ¼ to 3 inches. They are subjected to hydraulic tests of 400 pounds, cold water, both above and below the valve seat. Particular attention is directed by the maker to the ease with which the valve may be reground since this operation may be completed without the use of a regrinding machine or removing the valve from the line. Included in the bulletin is an interesting record of a test in which an "N. T. C." valve was opened and closed 327,094 times, at an air pressure of 125 pounds, before it began to leak. This valve is still giving satisfactory service after having been reground. The bulletin is handsomely illustrated.

HIGH DUTY PUMPING ENGINES. — Henry R. Worthington, 115 Broadway, New York City, in a recently issued bulletin, describes the Worthington horizontal, triple-expansion, high-duty pumping engine installed in the Hope Station of the Providence, R. I., water works. This engine has a capacity of 10,000,000 gallons in 24 hours against a head of 85 pounds per square inch and its design represents the latest practice in pumping engines of this type. One of its interesting features is its high-duty attachment involving the use of compensating cylinders which take the place of a flywheel. The arrangement is preferable to a flywheel in that the power exerted increases in almost exact ratio with the decrease of the power of the expanding steam. The accounts given of the duty trials show that the guaranteed duty was exceeded at full load by 4.5 per cent and at reduced capacity by 12.5 per cent. The actual duty at full load was 149,500,000 foot-pounds per 1,000 pounds of dry steam. The bulletin also shows and describes a similar engine installed at Fall River, Mass.

WROUGHT IRON PIPE.—The Reading Iron Co., Reading, Pa., has issued the ninth edition of its pamphlet, entitled "Court of Actual Experience". Attention is directed to comparative tests of iron and steel pipe, made with acid, which are claimed to be not only unreliable, but misleading. A special paragraph is contained in this pamphlet on accelerated corrosion tests in which is included a report by R. E. McBride of Youngstown, O., on tests made with old wrought iron sheets which had successfully resisted exposure to the weather for 40 years and which, when subjected to the acid corrosion test, lost 71 per cent in weight in 24 hours. A sample of ordinary Bessemer steel lost only 31 per cent in the same time. This is considered as confirming the Reading Iron Co.'s contention that such accelerated corrosion tests are misleading as a guide to durability of metals when exposed to the slow corrosion of actual service. A circular accompanies this pamphlet, which briefly outlines the company's facilities for manufacturing wrought iron pipe.

MOTOR TRUCKS.—The application of the motor truck to all kinds of heavy hauling is illustrated in a handsome, 64-page catalog, issued by the Peerless Motor Car Co., Cleveland. The trucks are shown under various service conditions with various types of bodies for different uses. These trucks are made in 3, 4 and 5-ton models, each in two lengths of chassis. The motor is located under the hood in front of the dash, where it is easily accessible for inspection or adjustment. The motor is of the 4-cylinder, 4-cycle, water-cooled type, with T-head cylinders cast in pairs. The bore is 4½ inches and the stroke, 6½ inches. The crank case is in two parts, all bearings being carried in the upper half. The radiator is of the horizontal tubular type and is supported upon spiral springs inside of the chassis channels, which absorb the road shocks. The front wheels are provided with solid rubber single tires and the rear wheels with dual tires of large diameter and wide face. Without load, the weight of the truck is about equally distributed to front and rear wheels. The low center of the gravity reduces the tendency to overbalance and this is accomplished without sacrificing load clearance. It also permits the use of a low platform when desired in a special class of service.

IRON AND STEEL SECURITIES

The New York share market for a large part of last week showed no decided tendency either up or down. Activity in bonds from first hands was very noticeable.

Monday, the American market was closed on account of Lincoln's birthday anniversary; foreign markets were dull and heavy, American securities closing lower. Tuesday the market opened weak and lower but rallied and closed higher all around; English consols advanced 5/8; wheat was weak and lower. Shares were less active on Wednesday and turned weak at the close, industrial stocks being under pressure, Republic preferred declining to the lowest price since 1909; cotton was weak. Prices were irregular Thursday, but averaged slightly higher, copper shares showing the largest gains; London's money market was easier and English consols higher, although the bank rate was unchanged at 3½ per cent. A heavier tone distinguished the market Friday in New York; foreign markets were irregular; cotton again declined and wheat was lower. Aggregate sales in New York Saturday were small and net price changes were insignificant.

Call money ranged between 2½ and 2 per cent, while time money was quiet throughout the week. The report of the actual condition of clearing house banks showed the following: Loans increased $75,000; deposits decreased $6,120,000; surplus decreased $1,413,900, bringing the surplus to $36,202,950. Non-member banks and trust companies showed loans increased $858,900; net deposits increased $5,402,000; reserve decreased $1,848,200, the percentage of reserve now being 19.8, a decrease of 0.5. Commercial failures for the week were 334, compared with 348 the preceding week and 252 the corresponding week last year. Bank clearings for the week showed a decline of 7.2 per cent from the preceding week, but an increase of 3.6 per cent over 1911. Shares were sold to the number of 1,386,600, compared with 1,906,960 the preceding week and 2,155,550 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $10,700,000, compared with $15,613,000 the preceding week and $13,098,000 the corresponding week last year.

	Clos'g Quo. Feb. 17	Changes in week.	Annual Meeting date	1912	Stock Outstanding	Basis.	Dividend Last Dividend	Date Last Div.	Pay
Allis-Chalmers	7/8	— 1/8			$19,820,000		.....		
Allis-Chalmers, pr	6½	— ½			16,050,000	7 cum.	1¾ Q.	Feb.	1904
American Can	11⅝	.....	Feb.	6	41,233,300		.....		
American Can, pr	92	+ ⅛			41,233,300	7 cum.	1¾ Q.	Jan.,	1912
Am. Car & Fdy	51	.....	June	27	30,000,000	2	½ Q.	Jan.,	1912
Am. Car & Fdy., pr	115	— ¼			30,000,000	7 n. c.	1¾ Q.	Jan.,	1912
American Loc	32⅛	— ⅜	Oct.	15	25,000,000	5	1¼ Q.	Aug.,	1908
American Loc., pr	104¼	+ ¼			25,000,000	7 cum.	1¾ Q.	Jan.,	1912
American Ship	50	.....	Oct.	9	7,600,000	4	2 Q.**	June,	1911
American Ship, pr	101⅜	.....			7,900,000	7 n. c.	1¾ Q.	Jan.,	1912
Am. Steel Foundries	28½	.....	Mar.	21	17,184,000	5	1¼ Q.	May,	1911
Barney & Smith	10	.....	June	4	2,000,000	4	1 Q.	Dec.,	1907
Barney & Smith, pr	80	.....			2,500,000	8 cum.	2 Q.	Dec.,	1911
Bethlehem Steel	30⅜	—1⅛	April	2	14,862,000		.....		
Bethlehem Steel, pr	58	—1⅜			14,908,000	7 n. c.	¾ Q.	Feb.,	1907
Cambria Steel	42¾	— ¼	Mar.	19	45,000,000*	5	1¼ Q.	Feb.,	1912
Cambria Iron	45	.....			8,468,000*	4	2 S. A.	Oct.,	1911
Chicago Pneumatic Tool	46¼	— ¾	Feb.	19	6,448,800	4	1 Q.	Jan.,	1912
Colorado Fuel	25¼	— ⅜	Oct.	21	34,235,500		1¼ Q.	April,	1902
Crucible Steel	11⅜	— ¼	Nov.	15	24,578,400		.....		
Crucible Steel, pr	81	—1			25,000,000	7 cum.	1¾ Q.	Dec.,	1911
Empire Steel	10	.....	Feb.	28	1,254,770		.....		
Empire Steel, pr	36	.....			2,500,000	6 cum.	2 S. A.	July,	1911
Fay & Egan	70	.....	Feb.	20	1,000,000	7	1¾ Q.	Nov.,	1908
Fay & Egan, pr	110	.....			1,000,000	7 cum.	1¾ Q.	Feb.,	1912
General Electric	157¾	+1	May	14	77,281,200	8	2 Q.	Jan.,	1912
Harbison-Walker	40	.....	Jan.	15	18,000,000	2	½ Q.	Mar.,	1912
Harbison-Walker, pr	100	.....			9,600,000	6 cum.	1½ Q.	Jan.,	1912
International Pump	30	.....	Dec.	13	17,762,500		½ Q.	Apr.,	1905
International Pump, pr	70¾	+ ⅜			11,350,000	6 cum.	1½ Q.	Feb.,	1912
Lackawanna Steel	30	— ½	Mar.	13	34,978,000		.....		
Lake Sup. Corp	28	.....	Oct.	2	40,000,000		.....		
New York Air Brake	50	—4⅞	Mar.	13	10,000,000	6	1½ Q.	July,	1911
Niles-Bement-Pond	95	.....	Feb.	7	8,500,000	6	1½ Q.	Mar.,	1912
Niles-Bement-Pond, pr	104	....			2,000,000	6 cum.	1½ Q.	Feb.,	1912
Otis Elevator Co	70	.....	Mar.	18	6,358,600	4	1 Q.	Jan.,	1912
Otis Elevator Co., pr	100½	+ ½			6,375,300	6 n. c.	1½ Q.	Jan.,	1912
Pa. Steel	60	.....	May	13	10,750,000		.....		
Pa. Steel, pr	100⅜	— ⅛			20,587,500	7 n. c.	3½ S. A.	Nov.,	1911
Pittsburgh Coal	17	— ¾	Mar.	12	28,104,600		.....		
Pittsburgh Coal, pr	79	.....	Oct.	7	27,071,800	7 cum.	1¾ Q.	Jan.,	1912
Pittsburgh Steel Co., pr	101½	—1½	Feb.	21	7,000,000	7 cum.	1¾ Q.	Mar.,	1912
Pressed Steel Car	31	—1½			12,500,000		1 Q.	Aug.,	1904
Pressed Steel Car, pr	100½	.....	Nov.	13	12,500,000	7 n. c.	1¾ Q.	Feb.,	1912
Pullman	159	— ½	Mar.	7	120,000,000	8	2 Q.	Feb.,	1912
Railway Stl. Spring	27½	.....			13,500,000	2	1 S. A.	Oct.,	1908
Railway Stl. Spring, pr	102½	+2	Oct.	16	13,500,000	7 cum.	1¾ Q.	Dec.,	1911
Rep. Iron & Steel	19⅝	—1¼			27,191,000		.....		
Rep. Iron & Steel, pr	74¼	— ¾	Mar.	13	25,000,000	7 cum.	1¾ Q.	Jan.,	1912
Sloss-Sheffield	40	.....			10,000,000	5	1¾ Q.	Sept.,	1913
Sloss-Sheffield, pr	112	.....	June	26	6,700,000	7 n. c.	1¾ Q.	Jan.,	1912
U. S. Pipe & Fdy. Co	13	—3			12,500,000		1 Q.	Dec.,	1907
U. S. Pipe & Fdy. Co., pr	50⅛	.....	April	15	12,500,000		1¼ Q.	June,	1911
U. S. Steel	59⅞	+ ⅛			508,302,500	5	1¼ Q.	Mar.,	1912
U. S. Steel, pr	108⅜	+ ¾			360,281,100	7 cum.	1¾ Q.	Feb.,	1912
U. S. Steel 5s	103	.....	Sept.	17	465,189,500	5	.....		
Va. Iron, Coal & Coke	60	—7¾	Oct.	1	9,073,680		5. †	Oct.,	1907
Westinghouse Air Brake	158	+ ¼	June	12	14,000,000*		5 Q.‡	Jan.,	1912
Westinghouse Electric	70½	.....			3,998,700*	7 cum.	1¾ Q.	Jan.,	1912

Par value of shares, $100, except those starred (*), $50.
**Includes last 1 per cent payment of 4 per cent extra.
†Stock.
‡Include 2½ regular, 1½ extra and 1 special.

Copper Stocks.

New York.—Amalgamated Copper closed 65¼, a net gain of 3¼.

Boston.—Butte Coalition closed 22¾, unchanged; Calumet & Arizona closed 60, a net gain of ½; Calumet & Hecla closed 425, a net gain of 15; North Butte Mining closed 25¾, a net loss of 1; Quincy Mining closed 76, unchanged.

Financial Notes.

The General Electric Co. has declared the regular quarterly dividend of 2 per cent, payable April 15.

The J. A. Fay & Egan Co., Cincinnati, has declared a quarterly dividend of 1¾ per cent on the preferred stock, payable Feb. 20.

The Harbison-Walker Refractories Co. has declared the regular quarterly dividend of one-half of 1 per cent on common stock, payable March 1.

THE IRON TRADE REVIEW

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A Familiar Note Across the Border

To those of our Canadian cousins, whose welfare is identified with the iron and steel industry, our sympathy goes out just now—goes out with the profound sincerity of experience. For we on this side of the lakes and rivers have had bitter cause to realize the extent to which a prosperous industry can be crippled and even paralyzed when it becomes the fashion, in governmental and political circles to heckle all accumulations of capital and thereby maintain a constant state of uncertainty in which only imperative business can be carried on.

Out of this chaos we are slowly emerging, if recent events in the industry are a true indication.

And, by the same tokens, into this same bewilderment is the iron and steel industry of Canada now tending.

Possibly present indications are being accorded undue importance, perhaps the dangers may be realized in time, or may be, if the industrial fevers do develop, there will be industrial physicians clear-headed enough to combat them.

But, as it now appears, the epidemic has slipped past quarantine and jumped the boundary line.

The party which went into power with the recent defeat of reciprocity has taken preliminary steps to create a tariff commission, with extremely wide powers of inquiry into manufacturing and trade conditions generally. This, in itself, is doubtless the wisest way of meeting the situation. The significant thing is that the tariff situation must be met, which means at best a bitter struggle with a compromise solution, where the agricultural West is squarely opposed to the industrial East.

"The iron and steel industry must receive more ample protection by an increase in tariff rates," argues a leading Canadian trade authority, asserting that the Dominion has become a veritable dumping ground for the United States.

"We favor tariff revision downward," resolves the great Dominion Grange, "with such an increase in the British preference as will shortly establish free trade."

"The reciprocity question has been settled for all time," says the average Canadian manufacturer. "Now we can work out our own industrial development free from outside influence."

"Reciprocity was defeated by less than 45,000 in a popular vote of over 1,275,000," again asserts the farmer. "Last year over half of our $736,000,000 foreign trade was with the United States. The issue was not killed, not even stunned."

But if tariff views are thus antagonistic, the bounty question is productive of even stronger feeling—and language. The leading iron and steel manufacturers have assured the government that the old-time bounty system must be, at least in part, restored. What the government will do is extremely uncertain. Steel securities bob up and down as prospects brighten or decline, and at Port Arthur a $5,000,000 steel plant is said to hinge on the decision.

And again the farmer has his say, through a Dominion Grange resolution: "We desire again to protest against the granting of public money to the iron and steel industries of Canada. Whatever justification for such a practice may have existed in years gone by, it exists no longer. Millions of dollars have been already paid out of the Federal treasury to pay dividends upon the watered stock of such industries as need no public aid, or to maintain in existence, with terrific economic loss, industries unsuited to their location. It is high time that the practice of giving public money to private corporations was abolished, as its fruits are only political corruption and economic loss."

All of which, barring only the term "bounty", has a strangely familiar note to us on the American side—familiar, monotonous, nerve-racking, reminiscent of idle plants and dwindling profits, of tariff hearings and tariff schedules, of investigations, subpoenas, indictments, dissolutions.

A long, long time we've listened to that note, and still it's ringing in our ears. If our Canadian friends are in for a siege of it, as now appears certain, we're truly sorry for them.

What the Public Gets From "Quotations"

The "dissolution" of the Standard Oil Co. and the American Tobacco Co. was the result, we are told, of a widespread public demand for a rigorous enforcement of the Sherman act. This same public, however, is already commencing to reap the only harvest which it could rationally expect from these decisions, namely increased prices. The Standard Oil Co. has recently raised the wholesale price of gasoline 1½ cents per gallon, and of kerosene 2 cents per gallon, with a corresponding increase in all retail prices. It is stated that this increase is partly due to the greater cost of doing business when operating the 30 odd separate companies into which the Standard Oil Co. was divided. Furthermore, the interests controlling the many companies that formerly made up the American Tobacco Co. are said to be contemplating a raise in the price of plug tobacco for similar reasons and the prices of the stocks of these new tobacco companies have consequently been rapidly advancing for the past ten days or so. It is further reported that the International Harvester Co. has advised Attorney-General Wickersham that the price of harvesting machinery will necessarily have to be increased should this company be dissolved and with this understanding it is perfectly willing to dissolve. It will be interesting to observe how much time elapses before this recent turn of affairs will chill the public ardor for "unscrambling the eggs". What the public has been

clamoring for is lower prices and all it has gotten out of the "dissolution" suits so far is higher prices. It will not be surprising if the increased quotations on such widely used necessities as gasoline, kerosene and tobacco have a decidedly depressing effect on the activities of some people who are anxious to see every combination in the country resolved into its original elements. Possibly after the public learns by hard experience that not only has competition not been restored, but that the cost of important commodities has actually been increased, it may be willing to return to the sensible doctrine of effective regulation as the only rational solution of one of the greatest economic problems which now faces the country.

The Hard Duty of Rails

Men have been so accustomed, through several generations, to seeing railroad rails perform their function satisfactorily that they do not realize that it is a wonderful duty they are expected to perform at this time. Shorn of all the opinion due to past performance when the service was altogether different, it is really a wonderful thing that rails stand up at all. Machinery of all sorts is continually breaking. In bridges and buildings, practically stationary structures, engineers allow large factors of safety, and as a rule the structures are safe, not because every particle of the steel is up to standard, but because the stiffness of the whole prevents disaster if there is a failure in the material at some minor point. With a rail, a failure at one point means disaster.

There are many locomotives in service weighing between 150 and 200 tons, and a few have lately been built with weights exceeding 200 tons. Frequently they run at more than 75 miles an hour. The track must be resilient; there must be a yielding of each tie as the weight passes over, and with perfectly laid ties the rail must still act as a girder between ties. If a single tie is improperly placed, the duty of the rail as a girder is suddenly and greatly increased. Obviously, in these circumstances, the rail must possess a wonderful toughness.

The other required element is resistance to wear. From rough estimates we have reason to believe that a rail wears out when between 50,000,000 and 75,000,000 tons weight has passed over it at the various speeds of actual practice. This must be accomplished with the loss of only a few per cent of the total material in the rail, and with no more than a slight deformation in the contour of the head. In the earlier days the service was altogether different. Iron rails were first used and it was many years before their wearing out attracted enough attention to cause definite steps to be taken for improvement. Then came the steel-headed rail, like the Nes Silicon rail, and rails capped with puddled steel. Of such steel-capped iron rails there were made about 25,000 tons in 1873.

With such a tremendous increase in the service required of rails, as regards toughness and hardness respectively, and an increase which has occurred so rapidly in recent years, it is by no means surprising to find that in the effort to obtain wear resistance by increasing hardness the increased requirement in toughness has not been fully met. The rail makers assert that the railroads have raised the carbon too high, to obtain hardness, so that the requisite toughness is not furnished, and it may be inferred that the railroads do not directly oppose that view.

The fact must be emphasized that it is not difficult to make a perfectly safe rail. The problem is merely to select the rail which at the lowest cost will meet the requirements. Whatever improvement is made will add to the cost; to the cost per ton if by special heat treatment, to the cost per rail if by a heavier section, or to the cost per year of service if by a softer material.

Incontrovertible Testimony

Read it. Read every word of it. Miss none of it.

We refer to the testimony of J. A. Topping, chairman of the board of the Republic Iron & Steel Co., before the senate finance committee in Washington, last Friday and published in full in this issue.

The senate finance committee is listening to some statements made by some manufacturers as to why they should not be put out of business, via the "Underwood tariff" route.

From the standpoint of the manufacturer, exporter and practical steel man, this is the most vital and unanswerable logic from beginning to end.

Read it. To observe the very evident hostility to the steel industry of one of the senators who, by his questions and attitude, indicated his position towards America's greatest manufacturing industry.

And in this he probably reflects likewise, the attitude of a large number of others who occupy similar positions and who are like this senator (who admitted that he had no personal knowledge of the conditions that are under discussion), and yet was not only willing but anxious to cast a vote that would, to a certain extent, be the death blow to American industry and enterprise—a vote that would react against labor as much as against the manufacturer.

Read it. To get Mr. Topping's viewpoint of the profit (or lack of profit) in the iron and steel business at present.

Read it. To learn this gentleman's opinion of the extent to which it is the apparent thought of American legislators to punish the American manufacturer when he endeavors to build up an export business.

Read it. To see how he punctures the theoretical sentimental fallacies of the men like Brandeis, who admitted that he had never been inside of a steel mill and yet talked for two days on the conditions in the steel plants of the country.

Read it. To have Mr. Topping's comparison of the extent to which foreign governments encourage and endeavor to build up, aid, help and strengthen their manufactures and their export business, while it is the mania of the hour in America to cast them into oblivion.

Don't miss a word of it.

Structure and Heat Treatment of Tool Steel[1]

A Discussion of the Microscopic Constituents of Tool Steel, the Effects of Annealing and Quenching

By J V Emmons[2]

Tool steel consists essentially of iron and carbon. There are however, four other elements always present, two of them, phosphorus and sulphur being injurious impurities, while the other two, manganese and silicon have some more or less valuable effect when present in certain proportions. The gases, oxygen and nitrogen, are also present in small amounts as injurious impurities, but are not usually taken into account. Frequently other elements are added to produce a special grade of steel for certain purposes. The principal metals added include nickel, chromium, tungsten, vanadium and molybdenum. The carbon in tool steels varies from about 0.8 to 1.50 per cent, according to different requirements. An analysis which is widely used for cutting tools and which may be taken as typical, follows:

	Per cent.
Carbon	1.20
Manganese	0.30
Silicon	0.15
Phosphorus less than	0.020
Sulphur less than	0.020

In the last few years it has been recognized that the structure of tool steel has fully as much to do with its properties as the chemical composition. This has led to the establishment of microscopic equipment in all well-equipped steel laboratories.

Microscopic Constituents

Ferrite is pure iron. It is usually recognized by its irregular, hexagonal-shaped grains. It is soft, ductile, has little strength and cannot be hardened. It occurs in tool steel normally only when mixed with cementite to form pearlite. It is found, however, in connection with certain abnormal conditions such as bark and graphite. These will be considered later.

Cementite is a carbide of iron containing 6.6 per cent carbon. It is very hard and brittle, resembling glass in these properties. Cementite is contained in small quantities in all tool steel over 0.80 per cent in carbon.

Pearlite is a mechanical mixture of cementite and ferrite, the two being arranged alternately in very thin plates. It contains 0.80 per cent carbon and is soft and tough. Pearlite is the chief constituent of annealed tool steel.

Martensite in tool steel contains from 0.70 to 0.90 per cent carbon and is produced by quenching in water or some similar bath from a temperature above the critical point. It consists of interlacing needles, which structure gives it great strength and hardness. Martensite is the principal constituent of hardened steel. A micro-photograph of it is illustrated in Fig. 3.

Sorbite is a transition from between martensite and pearlite. It may be formed by fairly rapid cooling from above the critical point or by drawing the temper of hardened steel. It is harder than pearlite and has great strength. Sorbite is the principal constituent of tool steel as it comes from the rolls or forge. Several other constituents and transition forms are known, but the above are of the greatest practical interest.

Inspection of Tool Steel

The inspection of tool steel is one phase to which the consumer frequently gives too little attention, and to this fact a large majority of the difficulties encountered in heat treatment may be attributed. Two methods of inspection are employed. The first is by chemical analysis and microscopic examination, which is available only with laboratory equipment.

The second is by the examination of the surface of the bars, plates, etc. and of the hardened fracture by the naked eye or the hand magnifier. The former method is the most accurate known and to it we owe most of our present knowledge of tool steel. The latter method is much less accurate when used alone, but in skilled hands it gives most valuable indications of the condition of the steel. It has the advantages of being inexpensive and available even in small shops. It is possible to detect in this way surface cracks, the presence of bark, pipes, overheated structure, graphite and bad cases of segregation of cementite as illustrated in Fig. 2. Microscopic examination shows, in addition to the above, the amount and condition of the bark, the exact amount of segregation, the approximate amount of graphite and the precise amount of overheating, all of which are necessary for the intelligent handling of tool steel.

The first step in the process of heat treatment is annealing. There is no best way to anneal tool steel. It is impossible for any one method to satisfy all conditions. Every consumer has his own especial problem of annealing to solve, the answer to which depends on the grade of steel used, the condition of the steel before annealing and the results desired.

Plain carbon steels are divided by the manufacturer into several grades ranging from 0.70 to 1.50 per cent carbon. In addition to these there are numerous grades of alloy steels coming into wide use known as chrome steel, nickel steel, tungsten steel, vanadium steel, chrome-tungsten steel, chrome-vanadium steel, etc. These special grades have widely different properties and frequently require special treatment.

The low limit below which it is not practical to anneal tool steel is about 1,200 degrees Fahr. The high limit above which it is not safe to anneal tool steel is about 1,500 degrees Fahr. In this range of 300 degrees practically all annealing operations are carried on. This great variation in heats is required mainly because of the previous condition of the steel or because special results are required. Steel as it comes from the mill is said to be in the natural state, but this is very indefinite as it may be in any one of a variety of conditions due to a lack of uniformity of melting, soaking the ingot, rolling, etc. The normal condition for unannealed steel is sorbite, containing in the case of steels over 0.80 per cent carbon, a fine, well-distributed network of cementite.

The Critical Point

For the proper regulation of annealing temperatures a knowledge of the critical point of the steel is necessary. The critical point in tool steel or as it is sometimes called the recalescence point, is the point in heating steel where the cementite is dissolved by the iron, and is the

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[1]Read before the Metal Trades Superintendents' and Foremen's Club, of Cleveland, on Saturday, Feb. 17.

[2]Chief Chemist Cleveland Twist Drill Co., Cleveland.

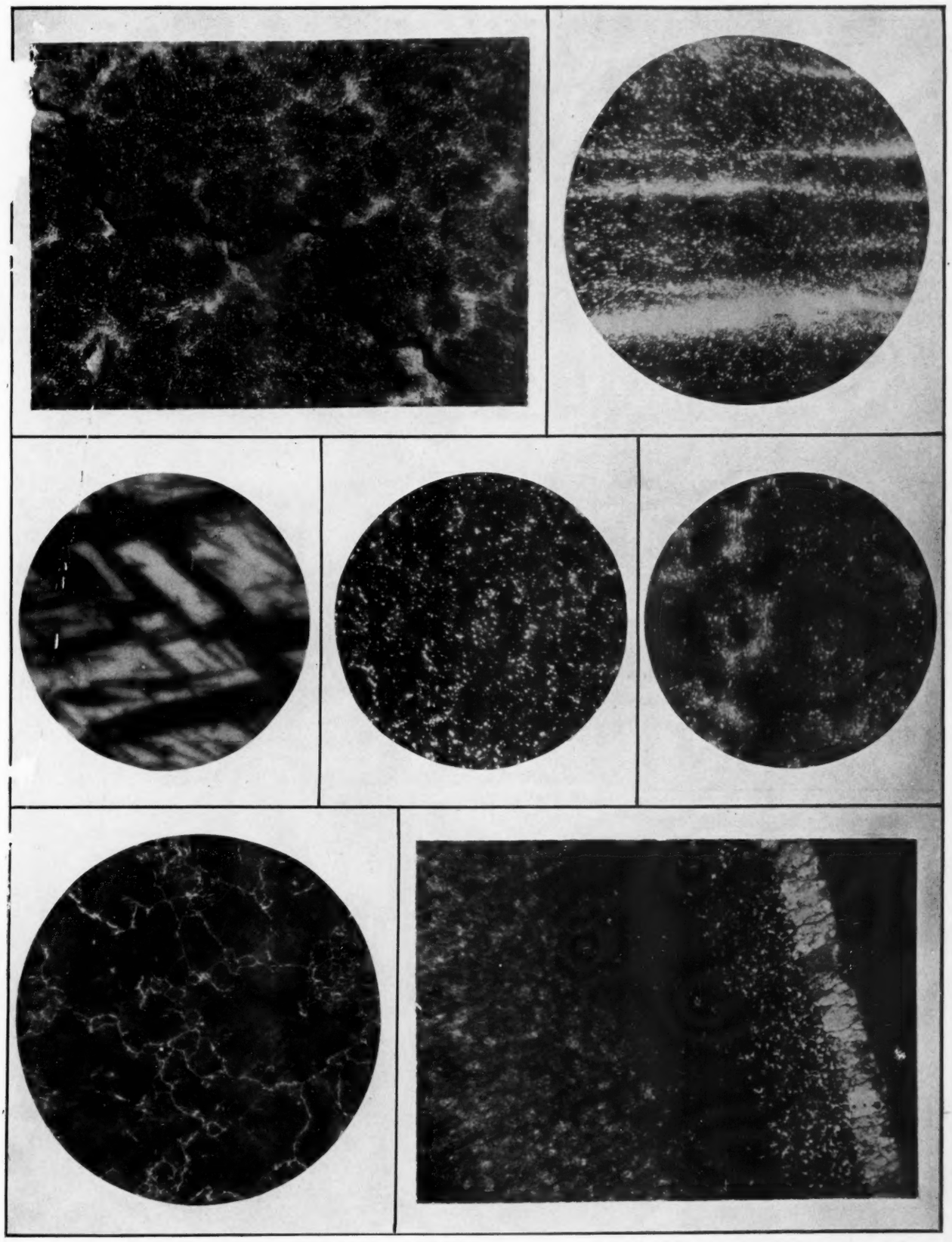


FIG. 1—FIRECRACK IN STEEL, FOLLOWING THE LINES OF CEMENTITE

FIG. 2—LONGITUDINAL SECTION, SHOWING SEGREGATION OF CEMENTITE

FIG. 3—MICRO-PHOTOGRAPH OF MARTENSITE

FIG. 4—CEMENTITE BROKEN UP, NOT LIABLE TO FIRECRACK

FIG. 5—CROSS-SECTION, SHOWING SEGREGATION OF CEMENTITE

FIG. 6—CEMENTITE NETWORK LIABLE TO FIRECRACK

FIG. 7—A MICRO-PHOTOGRAPH OF BARK ON STEEL

Insert, THE IRON TRADE REVIEW, *Feb. 22, 1912.*

point in cooling where the cementite crystalizes out of the iron. This might be roughly compared to water at about the freezing point. For the sake of comparison we will refer to the freezing point of water as its critical point. If you cool the water slightly below the critical point needles of ice at once begin to form. If we heat it above the critical point the needles at once melt or are dissolved. The cementite in tool steel behaves in the same way. If we heat it above the critical point, which is about a cherry red or 1,375 degrees Fahr., the cementite melts or is dissolved in the iron, but as soon as it cools again the cementite at once crystalizes-out. This separation of the cementite takes a certain amount of time. The hardness and toughness of hardened steel are due entirely to the fact that the steel is cooled so rapidly from above the critical point, that some of the cementite is trapped in the iron by the sudden stiffening of the cooling metal, forming martensite or hardened steel. But if the cooling from above the critical point is prolonged, the iron and cementite separate and lie side by side in the form of pearlite, or annealed steel. The critical point is marked by a number of interestng phenomena among the most important of which, from a practical standpoint, is the loss of magnetism. The critical point may be roughly determined as the temperature in heating at which steel no longer attracts a magnet, and the temperature in cooling at which it begins to attract a magnet.

Purposes for Annealing

The varied results which is it necessary to accomplish by annealing demand a wide range of treatments. The principal purposes for which tool steel is annealed are

1—To put it in condition to harden properly.
2—To put it in condition to machine.
3—To put it in condition to draw into wire.

To put steel in condition to harden, it is necessary to give it the finest possible structure and at the same time the best possible distribution of cementite in case the steel is above 0.90 per cent carbon. It is generally recognized that this may be best accomplished in steels which have no abnormal conditions present, by annealing at a temperature slightly above the critical point. If a laboratory and pyrometers are available the critical point for each grade of steel used may be determined accurately. If these facilities are not at hand the critical point may be determined roughly by means of a magnet.

To put steel in condition for machining it is necessary to take into account the different machining operations. The three principal operations on tool steel are turning, milling and threading. The turning operation requires steel as soft as it can be obtained. The milling operation requires steel slightly harder in order that the metal will not drag, making the work rough and gumming-up the cutter. The threading operation requires steel still harder in order that the metal will not drag nor the threading tool throw up a burr. Steel that will thread perfectly will frequently cause great difficulty in turning. Where only one of these operations is necessary the annealing may be adjusted with little difficulty, but if two or three of the operations must be performed upon the same work the only solution of the problem is to endeavor to strike the happy medium where all of the operations can be performed at least fairly well.

In drawing tool steel into wire it is necessary to anneal after each draft, in order to soften the steel and restore the low elastic limit destroyed by the stretching as it was drawn through the dies. This wire is annealed by heating to a temperature considerably below the critical point for a considerable length of time, the low temperature being necessary to avoid the formation of bark and graphite.

Some of the abnormal conditions which may be present in unannealed tool steel are coarse structure, due to overheating or a high finishing temperature under the rolls; segregation of cementite, and bark.

The refining of the coarse structure due to overheating usually requires a double treatment involving first an annealing at a temperature from 100 to 150 degrees above the critical point. This annealing completely breaks up the over-heated structure. It is then given a second annealing slightly above the critical point to still further refine the structure left by the first treatment.

The segregation of cementite caused usually by prolonged soaking is in danger of being increased by annealing. If it is not too far advanced, it may be improved by a treatment similar to that for overheated structure. Bark and graphite are the two most undesirable products of annealing.

Bark is the completely or partially decarbonized layer of steel near the surface. It is due chiefly to the oxidizing action of air and other gases upon the steel while it is at a high temperature. It has been observed in depths varying from 0.001 to 0.125 inch. All steel has more or less bark unless it has been removed by pickling or grinding. The principal cause of its production in annealing is an oxidizing condition which may be due to air, a large quantity of scale or rust on the steel, or some packing material which contains oxygen. A micro-photograph of bark on steel is illustrated in Fig. 7.

It is very important that all of the bark be removed from the steel for the reason that it will harden only in proportion to the amount of carbon it contains, which in any case will be less than that of the interior of the steel, and may be so low that it will not harden at all. Difficulty caused by bark is in the turning operation. In a high carbon steel containing from 1 to 1.50 per cent carbon, a large part of the bark will approximate 0.70 to 0.80 per cent carbon. The critical point of steel containing 0.70 per cent to 0.80 per cent carbon is very low. Therefore, when the steel is annealed at its appropriate temperature the bark is considerably overheated, with a resulting coarse structure.

Bark on Round Bars

On round bars this forms a ring of hard, overheated steel which is extremely difficult or even impossible to turn accurately. The best remedy for this condition is to anneal in such a manner as to produce no bark, but if it is necessary at any time to soften a bark so that it may be machined, it may be done by re-annealing at a temperature varying from 1330 to 1375 degrees Fahr., depending on the grade of steel used.

The second by-product of annealing is graphitic carbon sometimes known as *black fracture* or *black center*. In this condition part or all of the carbon has been driven out of combination in the form of graphite. This practically amounts to changing the tool steel into a high grade of malleable cast iron. It is caused by either repeated annealings or prolonged annealing at a temperature below the critical point. Once formed, the only remedy is to remelt the steel.

When it is desired to anneal steel which has already been hardened, annealing at a temperature just below the critical point is usually satisfactory. High speed steels may be annealed at temperatures varying from 1325 to 1400 degrees Fahr. in a manner similar to plain carbon steel. Greater care is usually taken to pack

the steel in such a manner as to prevent bark.

There is a method of quick annealing high speed steel which is useful where it is necessary to anneal a single tool as quickly as possible. It consists simply in heating the tool to 1,300 degrees Fahr., allowing it to cool in the air, reheating to 1,300 degrees Fahr. and holding it at that heat for 30 minutes, when it is allowed to cool in the air. This will be found successful for most high speed steels now on the market, making the tool soft enough to machine and putting it in condition to reharden perfectly.

Hardening Tool Steel

Tool steel to be hardened must be heated to a temperature above the critical point and cooled rapidly in some quenching bath such as water. The degree of hardness depends upon the rapidity of cooling and also upon the amount of carbon present. The higher the percentage of carbon and the faster the cooling the harder the steel will become. When tool steel is quenched at a temperature slightly above the critical point, it has the finest structure that it is possible for it to attain. The higher the heat above the critical point the coarser the structure becomes. The hardening temperatures for most tool steels in use today lies between 1,360 and 1,450 degrees Fahr.

Closely connected with hardening is the drawing operation. For most purposes it is found necessary to draw or temper hardened steel in order to relieve strains and increase the toughness. This is accomplished by reheating the hardened steel to a low temperature varying from 400 to 600 degrees Fahr., according to the degree of hardness and toughness it is desired to obtain.

One of the principal difficulties encountered in hardening steel is the liability to firecrack. Firecracks are especially liable to start from sharp corners, sharp angles or deep recesses. These should be avoided in the design of tools whenever possible.

Causes of Firecracks

The two principal causes of firecracks are high sulphur content and bad distribution of cementite. The amount of sulphur can only be detected by a chemical analysis. The condition of the cementite can only be determined by microscopic examination. The effect of the condition of the cementite upon the hardening of tool steel cannot be too highly estimated. In hardened steel the cementite contains that portion of the carbon which is in excess of 0.80 per cent. The amount of it present is of little importance compared with the condition in which it is present. It should be remembered that cementite is extremely hard and also extremely brittle. If it is present in a network, long plates or connected masses, it forms a line of weakness which is easily fractured under the hardening strains. These lines of weakness are shown in Fig. 1. If the cementite is properly broken up by the annealing or previous heat treatment it will be present in small, rounded particles, each one isolated from the others. Such a structure gives the maximum strength to the steel. If the sulphur analysis of a steel is known to be satisfactory, the relation of the condition of the cementite to firecracks may be expressed briefly as follows:

If the cementite is present in plates or large masses the tool will firecrack. This network is illustrated in Fig. 6.

If it is present finely broken up in round particles the tool will not firecrack, this structure being shown in Fig. 4.

Cementite and Cutting Qualities

The effect of the condition of the cementite upon the cutting qualities of the steel tools is of even greater importance. To understand the action of a cutting tool take the example of a lead lap. If a piece of lead charged with diamonds the size of shot were held against a rapidly revolving piece of metal the diamonds would start to cut, but would be instantly torn away from the soft lead in which they were imbedded. The result would be that the lap would be rapidly spoiled, while the work was only roughened. If the lap is charged with fine diamond dust each particle of diamond takes a very small cut and is held firmly by the lead until it is worn away. Such a lap cuts almost as fast as an emery wheel and produces a smooth, finished surface with very little wear of the lap.

In a steel cutting tool, if the particles of cementite are large they are rapidly torn away, exactly as in the lead lap, causing the cutting edge to crumble and wear away rapidly. But if the cementite particles are small and uniformly distributed, they are held firmly and stand a large amount of wear. This fact is so important that it may be stated that for tools of the same analysis and degree of hardness, the amount of work done will be in proportion to the fineness of distribution of the cementite.

It may also be stated that for finishing tools the better the distribution of the cementite the finer the finish it is possible to obtain. In this connection it is sometimes asked; "Why is it that high speed steel does not make good finishing tools?" This can be best explained by a comparison. If you wish to saw a piece of wood in such a way as to leave the smoothest possible surface you naturally select a saw with the finest possible teeth. If you wish to saw very rapidly without regard to the roughness of the work you select a saw with very coarse teeth.

Applying this same principle to steel. A high grade carbon steel, proporly made into a finishing tool has the cementite distributed in very fine, uniform particles in a martensite matrix so fine as to be almost structurless. Such a tool produces a very smooth finishing cut. On the other hand, high speed steel consists of fairly large grains which break apart producing a rough edge which will cut very rapidly, but not smoothly.

Buffalo Exhibit of Foundry Equipment

As no satisfactory building is available for the exhibit of foundry supplies and equipment, which was to have been held in connection with the foundrymen's conventions in Buffalo in June, it is probable that the Foundry & Machine Exhibition Co. will postpone the date of its exhibit in Buffalo until some time in September. An effort will be made to obtain the consent of the various allied associations to this change of date. It was practically decided some time ago to hold the exhibit in the Broadway Exposition building, Buffalo, but owing to repairs that are under way and which will not be completed until the summer months, this building will not be available until August or September.

Rebuilding Contracts Let

The Lynchburg Foundry Co., Lynchburg, Va., advises that it has contracted with the Virginia Bridge & Iron Works, Roanoke, Va., to replace those buildings destroyed by fire on Jan. 19. The blacksmith shop will be 35 x 100 feet and the machine shop 70 x 100 feet. It has not yet been determined what new equipment or machinery will be purchased.

Steel Rail Controversy Rapidly Reaches Crisis

Makers and Users Meet in New York to Harmonize All Points of Difference

What is hoped and intended to be the most conclusive and exhaustive investigation into the question of what constitutes a safe quality of steel rails has been formally inaugurated by a committee consisting of representatives of the steel companies and of the railroad companies. The form of such an investigation was shaped at an all-day conference in New York City, Thursday, Feb. 15, at which the leading railroad systems of the country were represented by executive officers, and the rail-making steel companies of the country by their presidents. This meeting was called by Chairman Elbert H. Gary, of the United States Steel Corporation, as chairman of an executive committee of railmakers and railroad officers which has been created in recent years for the study and solution of steel rail problems. The conference in New York followed a similar but somewhat less notable meeting held at Chicago the preceding week.

The problem of determining the character and structure of a steel rail that will afford maximum safety in use has assumed increased proportions in recent years, owing to the increasingly severe requirements that have been brought about by modern traffic conditions. The railroads and the steel mills have approached this question from different viewpoints and the result has been a considerable variety of specifications under which rails have been manufactured. The railroads in their quest of a rail that would combine safety and wearing qualities and, therefore, economy, have been inclining toward the harder steel or higher carbon rails. The rail makers, where they have been free to do so, have been rolling and advocating the softer or lower carbon quality. The question of price has been involved in this controversy only indirectly. It has necessarily been attached to the presentation to the mills of more exacting specifications by the railroads, but has not been one of the direct points of disagreement in these discussions.

President James A. Farrell, of the United States Steel Corporation, stated the position of the railmakers of the country and their conclusions on this subject in the course of his testimony recently given before the Stanley investigating committee at Washington. On that occasion, Mr. Farrell said:

"The public demands, and rightly, that railroad transportation shall be safe and that rails shall not break. I am absolutely convinced that if railroads are to accomplish this they must be prepared to face a greater wear of steel rails. In other words, under the severe and often unknown demands of modern railroad traffic, choice must be made between safety and wearing quality in steel rails.

"Beginning about 1890, the railroads of the United States began to ask for higher carbon in steel rails in order to secure greater wear; and the rail makers unwisely, and many times under protest, made the quality of steel demanded. Gradually the specifications called for still higher carbon, until today I believe the steel is within the danger zone of brittleness. The carbon is so high that we get the brittle rail.

"It is true that many of these hard rails never break, but the liability to breakage is much greater than in the old-time softer steel; and the influence of the unavoidable contingencies of manufacture, such as seams, pipe and segregation, is much greater. In many respects the steel is more doubtful, more dangerous and more treacherous. It is unquestionably, in my judgment, an unsafe grade of steel, in view of the severe conditions of service.

"If safety is to be the first consideration, lower carbon, softer steel would seem to be necessary. With such steel the various unavoidable defects or variation of commercial rails would be far less dangerous. Seams, pipes and segregation would all be less dangerous. Less likely, also, to cause breakage would be the cold working in straightening, and the many contingencies of track and rolling stock would be less likely to cause breakage.

"The breakage of rails is frequently caused by improperly ballasted track, uneven bearings on cars, flat wheels, engine-driving wheels being out of round or badly worn, unbalanced driving wheels, center of gravity of engine too low, slipping of engine drivers, and prolonged low temperature.

"I believe that I am correct in stating that harder steel is used in rails in the United States than in any other country, and yet our wheel-loads and train-loads are much greater than those on foreign roads.

"The British board of trade, which has authority in such matters in Great Britain, would consider the high carbon used for rails in this country as dangerous, especially as our phosphorus, in Bessemer rails at least, is also higher than theirs.

"When, with increased weight of motive power and rolling stock, it became necessary to strengthen bridges, engineers did not try to do so by using a harder and higher tensile strength steel. They increased the amount of metal of the kind they had been using, because they knew they must have a safe steel and a large factor of safety.

"At the present time we are rolling some rails for the New South Wales government, for which they are paying us $100 per ton, not $28. They are manganese steel rails, to be used on curves and grades.

"The engineers of railways should not endeavor to overcome the increased wear of rails under modern conditions by using a rail that is so high in carbon that it is likely to be brittle. You might say that a soft rail would wear out more quickly. The old soft rails, under the conditions of their day, gave very satisfactory wear, and it is my belief that that wear would be less rapid than most people estimate; providing, of course, the section of rail is heavier. Instead of using an 80-pound rail with lower carbon, they might use a 90-pound rail—a heavier rail—which would give more actual metal to be worn away before the rail becomes too weak.

"In my opinion, the proper course for railroads to pursue is to use a heavier rail of softer steel, making safety the prime object and getting the maximum wear they can get under such conditions."

The present investigation has for its prime object, the determination and the concurrence of opinion among makers and users as to the most practicable rail of greatest safety, and it is hoped that these conclusions will be reached through the most complete and comprehensive study of this question that has yet been attempted in this country. Other questions upon

which the rail makers and rail mills have differed in the past are being subordinated to this aim, though they will, of course, enter largely into the investigation. Such questions will include the discard of the ingot, the making of tests, inspections, etc.

In the study of the problem, the rail specifications followed in foreign countries will be sought and carefully examined and all the known and available engineering experience in different parts of the world will be called upon to lend light to the final solution.

A general statement covering the purposes and results accomplished was made public by Chairman Gary, following the conference in New York. This is as follows:

The meeting was called to consider the subject of improving, if possible, the character and quality of rails. After a full discussion of the whole subject, in which nearly everyone present participated, a committee consisting of all the members of the executive committee of the American Railway Association and the presidents of the manufacturing companies was appointed to tabulate the data already obtained and to receive further information and to consider the subjects and to report their recommendations at a future meeting to be called by the chairman of the executive committee.

This committee consists of Presidents Willard, of the Baltimore & Ohio, Loree of the Delaware & Lackawanna, Mudge of the Rock Island, and Vice President Kruttshnitt of the Harriman lines, and several other railway officials. The manufacturing companies are represented by Presidents Dinkey of the Carnegie Steel Co., Buffington of the Illinois Steel Co., Schwab of the Bethlehem Steel Corporation, Clark of the Lackawanna Steel Co., Wood of the Maryland Steel Co., Felton of the Pennsylvania Steel Co., Price of the Cambria Steel Co., Crawford of the Tennessee Coal, Iron & Railroad Co., and Farrell of the United States Steel Corporation.

It was the unanimous sentiment that everything practicable should be adopted to secure a rail that is entirely safe. The committee will meet at a date to be fixed by Chairman Gary and President Willard, and a meeting will probably be held within a week or ten days.

Judge Gary's Statement of Steel Rail Case

Chairman E. H. Gary, of the United States Steel Corporation, summarizes the underlying circumstances and the purposes that the investigation seeks to serve in a statement given to THE IRON TRADE REVIEW as follows:

"The first important thing that is to be considered in this discussion is the fact that the winter season has been unusually severe and in many localities the temperature has been so low that rails have been seriously affected. They are usually more liable to break in extreme cold weather. In latitudes where the weather has not been so cold during the past winter, breakages have been comparatively few.

"Secondly, the cost of railroad operations has been increasing by reason of high labor, regulation by the Interstate Commerce Commission concerning the kind and character of equipment, etc.; and the increased cost of some materials, particularly ties. As a result, the railroads have been obliged to adopt the most economical plans for operation. To do this, they have very largely increased the weight of equipment and speed of trains, both passenger and freight. This has resulted in an increased and extraordinary use of the rail.

"To meet these changed and changing conditions both the railroad companies and manufacturing companies have for the past few years been giving, through their experts, special consideration to the question of improving, if possible, the wearing qualities, the toughness and the strength of the rail. To make the rail hard and safe against crushing and other damage, many have thought the rails should be harder and, therefore, higher carbon has been specified. Others have thought that the carbon specified was too high because it tended to make the rail brittle. As to the exact point of highest safety and the best, most economical and, therefore, practicable rail, there have been differences of opinion. The interests of rail makers and of the rail users are identical and, therefore, all are desirous of bringing about the best and most satisfactory results. The manufacturers and the railroad companies are now in consultation and co-operation upon this question. The highest officials of each have the matter well in hand and will continue their investigations, consultations and developments until the desired result is reached."

BOND SALE MADE

By Phillips Sheet & Tin Plate Co. to Provide Extensions.

For the purpose of obtaining funds with which to care for extensions and improvements, and to complete the purchase of the Pope Sheet & Tin Plate Co. and its properties at Steubenville, O., $1,000,000 first mortgage, sinking fund, 5 per cent bonds have been sold by the Phillips Sheet & Tin Plate Co., with plants at Clarksburg and Weirton, W. Va., to the Bank of Pittsburgh. The bank has disposed of one-half of the issue, and is offering the remainder at 97½ and interest. The bonds are redeemable at 102½ and interest on and after Feb. 1, 1917. Sinking fund requirements provide for $100,000 per annum.

Select New Officers

The Fairbanks Steam Shovel Co., Marion, O., has selected Col. C. W. Fisher, Bucyrus, O., as president, and J. E. Marbaugh, Monterey, Ind., as general manager, following the retirement of James G. Fairbanks as president and general manager. Messrs. Fisher and Marbaugh and Director A. G. Stolz, Bucyrus, will comprise the company's finance committee.

In Market for Machinery

The Moore Drop Forging Co., Springfield, Mass., is adding to its shop a one-story brick building of mill construction. It will be 70 x 115 feet, and is to be used for manufacturing purposes to take care of the growth of the company's business. The company will be in the market for a considerable amount of machinery.

E. C. Hazard has disposed of his interest in the firm of Hazard, Coates & Bennett Co., Rochester, N. Y., dealers in iron and steel scrap, railway materials and supplies. The company advises that it will continue its methods of carrying on business, no change being effected by Mr. Hazard's leaving the firm.

The Brown-Wales Co., Boston, recently gave a luncheon to about 25 of its office men and salesmen. The luncheon was served in one of the offices of the company. Informal remarks were made by a number present and all thoroughly enjoyed the occasion.

S. O. Bradley has been appointed receiver of the American Foundry & Supply Co., Asheville, N. C.

Topping Enlightens the Senate Committee

Surprising Members by His Explanations and Opinions—
Contrasts Conditions in the United States and Foreign Countries

John A. Topping, chairman of the Republic Iron & Steel Co., appeared before the senate finance committee on Friday, Feb. 16, to discuss the general metal schedule in the proposed tariff bill. The Republic Iron & Steel Co. employs 12,500 men and has plants in Alabama, Illinois, Pennsylvania, Ohio, Michigan and Minnesota. His general contention was that the proposed bill does not equalize the difference in labor alone in any iron and steel product. He maintained that England and Germany under the proposed bill could deliver steel products on the Atlantic seaboard, including freights, cheaper than his factory could put them there. He pointed out a number of glaring inconsistencies in the bill.

Mr. Topping submitted a statement and invited the committee to make notes and ask him questions, which they did quite generously. He said:

"I am very glad to make this statement of record: I maintain that there is no profit in iron and steel. I have before me, which I will leave, the semi-annual report that I presented to our stockholders on Jan. 1, 1912, which shows that we earned at the rate of about 6¾ per cent, I think it is, on our capital stock. The next question that might be asked naturally is: Does your capital represent fair capitalization? I think I can answer that question 'yes'. The Republic Iron & Steel Co. was one of the early companies or so-called 'combination', formed in 1899 and the early part of 1900. It originally represented 29 different iron-producing companies. Today, instead of having 29 plants, we have nine. The basis of capitalization at the time of organization or the inception of this company was on an appraisal value or the replacement value of the original plants. There was put in for working capital, I am told by the promoters—I have only been with the company about six years, and the records of the company do not show this, but I am reliably informed that this is correct by the attorney who put the companies together—$6,000,000 of working capital, and the value of the plants appraised by an expert committee, was the basis for the issue of preferred stock. The common stock represented good will. The earning power I have just spoken of is based on the preferred stock. Nothing was earned on the common stock."

Never Paid a Dividend

The Chairman: "Has the common stock ever paid a dividend?"

Mr. Topping: "It has never paid a dividend. In addition to the money put in, there were no bonds at that time. The company, of course, has grown—grown at the expense of borrowed capital, largely. We put in $12,500,000 of bonds, issued that much of bonds; we have increased our capital stock, from $22,000,000 originally to $25,000,000. We have spent about $21,000,000, all told, since the formation of the new company in new property additions and extensions, and with an organization that is thoroughly self-contained in all respects save transportation. In other words, we produce everything that we consume, from coal, coke, iron ore, limestone, pig iron, steel, and many finished products, embracing nuts, bolts, spikes, shafting, polishing material, plates, tubular products of all kinds, merchant bars, and many other smaller incidental products. So that from the standpoint of being properly integrated for economical operation, I think we can fairly lay claim to being organized on that basis; and I think our figures will show that we are not over-capitalized."

Senator Cullom: "Where is the headquarters of your company?"

Mr. Topping: "Our principal operating office is at Youngstown, O. We maintain offices all over the country. The executive or administrative office is at New York, and our financing is done from there."

Senator Cullom: "It used to be in Chicago, did it not?"

Mr. Topping: "Yes, sir. We removed the office from Chicago, but we still have works at Chicago, Moline, East St. Louis, and at Muncie, Ind. But we have large works in Ohio, around Youngstown, and we operate a great many mines and coke-ovens through Pennsylvania, and blast furnaces, as I stated, in Alabama, before you came in, senator."

Senator Williams: "I understood you to say that your books did not show how these plants that were taken into the combination were valued."

Mr. Topping: "Yes, sir; they did. I made that statement, Senator Williams."

Senator Williams: "The books do not show it. Why is it that the books do not show it? How did it happen that the books do not show it?"

Senator McCumber: "I think you misunderstand each other. Your testimony was that the books did show it; was it not?"

Mr. Topping: "I made the statement as the senator put it—that the books do not show, because in the early books the plants were put in in a lump sum. I could not tell how much valuation was put on each plant. The books show what the total value

Topping on the U. S. Steel Corporation

"The United States Steel Corporation, as is known, is the greatest producer of iron and steel in the world. As a competitor of that company, I want to say that it has done more to uplift labor, create better living conditions, it has stood more strongly for the maintenance of wages, than any other producer of iron and steel. Perhaps one reason for it has been that it has had the ability to do it. It has had the earning power that permitted it. The smaller companies, the so-called independent companies, have had to meet that competition. As a result, since 1900, I ascribe the increase in wages more largely to the efforts of the Steel Corporation than to the natural conditions of supply and demand of labor."

Conditions in Industrial Centers

"Much has been said about 'white slavery,' and the conditions of living in iron and steel centers. The Republic Company owns and maintains a great many different communities or towns—camps, if you please—of their own. I want to go on record as saying that the living conditions in those towns, both sanitary and otherwise, are far ahead of and better than any industrial communities where the town conditions are controlled by municipal authorities; and the wage conditions in iron and steel, generally speaking, are, as I have stated, the highest ever known, and better than those of any other industry that I know anything about; and I know about several, because I am interested in several."

of the plant and the total amount of cash was."

Senator Williams: "I understand that; but the books do not show the individual value of each plant that was taken in?"

Mr. Topping: "No, sir."

Senator Williams: "Stock was issued for the value of the plant?"

Mr. Topping: "Let me tell you why that was done."

Senator Williams: "And yet the books show the valuation of each plant. My question is, how did it happen that the books do not show that?"

Mr. Topping: "I think the reason for it was this—"

Senator Williams: "It seems to me that ought to have been done."

To Maintain Harmony

Mr. Topping: "When the 29 different concerns were put together, there was naturally more or less jealousy as to the value A, B or C might have received for a plant. A might have thought his plant was better than B's; and in order to put them together, they were covered up to avoid any dissension of that kind."

Senator Williams: "So the matter was purposely concealed?"

Mr. Topping: "That is an assumption on my part. I do not know that from any fact."

Senator Williams: "To keep the several plants from knowing what each of the others had gotten?"

Mr. Topping: "Yes, sir; to maintain harmony in the organization.

"As against my statement as to the earnings, some companies have not earned their fixed charges in the last year; and some have gone into the hands of receivers. None of them, outside of the Steel Corporation, have earned over 6 per cent, or 6½ as a maximum, on their invested capital, that are reporting their statements publicly."

The Chairman: "Most of the large concerns make public reports; do they not?"

Mr. Topping: "Yes, sir. Ours are public reports; and, as you will see, very great publicity is indulged in by our company. I have some data here on the question of profits abroad which I cannot put my hands on just at the moment.

"As against the statement of earnings in this country, I have in my tariff brief, submitted to the ways and means committee, some data that I think will be recognized as reliable, as to the earning power of foreign companies engaged in iron and steel. I state there that in 1907 the capital employed was $70,000,000, covering a certain group of industries. The average rate returned on that capital was 5.4 per cent. There was paid to labor $306,000,000, or 332 per cent in excess of what capital received. The company I represent paid its capital approximately 5¾ per cent, and to its labor $5,832,000 in 1907, or 444 per cent in excess of that paid to capital, which would indicate that the estimates presented above are correct.

"In striking contrast to the estimated average dividend of less than 6 per cent paid to stockholders of American iron and steel manufacturing companies, the Berlin correspondent of *The Iron Age*, in the issue of Jan. 14, 1909, states that the average dividends paid to the stockholders of 13 of the largest German manufacturing companies of iron and steel for the year 1907 were 13.66 per cent, and for the year 1908 the total was 11.89 per cent, or nearly double what was received here."

Senator Williams: "Just one question there: During the time that you were declaring this dividend, how much did you add to your surplus?"

Mr. Topping: "Our total surplus today is five million two hundred and some odd thousand dollars."

Senator Williams: "How much of your earnings went into the increase and improvement of the plant?"

Mr. Topping: "Since 1900 my recollection of the figures is that allowing for our capital increases during that whole period of time, we probably show between five and six millions of dollars added plant values, due from the earning power in excess. As against that, of course, you have got to charge off liberal sums for depreciation, because during that ten years of time we have changed the 29 plants to nine, and have completely changed the operation from iron to steel. In other words, we are wrecking 20 and extending and improving nine. Take our blast furnaces in Alabama: We have spent since 1909 over two and a half million dollars in reconstruction of those blast furnaces, as against a total first cost investment of about $3,000,000.

"I mentioned briefly in my last paragraph the question of foreign competition. It is not a question of the difference in cost wholly, or the difference in transportation. There is another difference that I want to call your attention to which perhaps you have heard indirectly, as to German methods. The German manufacturer has worked out the scheme of co-operation with his government in the most effectual way that I know of. As a result of the team-work, the manufacturer and the laborer and the government are performing in Germany, she has made most wonderful strides in the exportation of her manufactured products, not only in iron and steel, but in everything else. She employs her labor better than almost any other foreign country, because they have had that combination of influence at work in their favor. In the last ten years, I think the figures will approximately show that the German exports of iron and steel have increased over 500 per cent; and yet Germany is a protection country, as you know. The reason that export has grown so enormously, in my opinion, is that they have had the benefit of co-operation. They have been permitted by the government to syndicate or pool operations to such an extent that a group of manufacturers—for instance, A, B, C and D—would get together, and if A could export some given product, B, C and D would pay A for the exports, if he made a loss, a bounty on those ex-

A Colloquy With the Mississippi Senator

Senator Williams: "Your combination resulted in closing up 20 plants?"

Mr. Topping: "Yes."

Senator Williams: "Shutting down 20 plants?"

Mr. Topping: "Shutting down 20 plants, and doing more business at nine that we did originally at 29, and employing more labor, and paying much more in wages."

Senator Williams: "How did the total volume, the number of workingmen in the nine plants compare with the number of workingmen in the original number?"

Mr. Topping: "It increased; I think it nearly doubled. The reason why those plants were closed—

Senator Williams: "You merely concentrated the work; did you?"

Mr. Topping: "Exactly; it was a concentration for purposes of economy. In other words, it was a case of moving plants improperly located to more convenient spots for sending raw material, conserving transportation, and utilizing the economies that one district would present as against another. That is wholly and solely the reason, and that is about the only merit there is in combination. If you cannot get that economy out of it, you had better not combine."

ports so as to equalize the profits exported to the basis of the general syndicate profits in the entire operation. The result has been that the exports of German steel at times have shown a great loss, but the average results to the German syndicates have always shown a great profit, as I indicated in my previous statement as to earnings of 11 and 12 per cent per annum. If we, the manufacturers here, got together as I was trying to get together recently, a body of manufacturers to form an export company and have a central selling agency, our attorneys tell us we would be open to possible attack as violating the Sherman anti-trust act. And yet our purpose in combining would be for the extension and not the restraint of trade."

German Policy

Senator Williams: "Of course. Now, coming back to the German situation a minute: The upshot of it all is that they recouped in their home market for what they lost on their export trade?"

Mr. Topping: "They did."

Senator Williams: "That is what I thought."

Mr. Topping: "That is exactly what they did."

Senator Cullom: "Can you tell how much that export amounted to?"

Mr. Topping: "I have some data here that I want to submit to you on that point. This is from my brief before the ways and means committee:

"Foreign competition cannot be measured by the cost of production alone, as under the influence of legalized syndicates or trust agreements the foreign producer follows a policy of extreme aggression; and to this policy governmental railroads and subsidized steamship lines contribute. So destructive has this character of competition become, even to England, that an English writer—Mr. T. Good, in *Cassier's Magazine*, for November, 1908, states:

"'As an illustration of an incident of losses incurred on exports, that on an operation for six months a wire-rod syndicate reported domestic profit of £58,000, and loss on exports of £42,000.'

"In other words, there was a loss of over $203,000 in a six-months' operation. Yet they recouped that loss from the profits on their domestic consumers."

Senator Williams: "Which their tariff enabled them to do?"

Mr. Topping: "Not necessarily. Their syndicates enabled them, and the government permitted them, to do it. The advantage was that in their exports they employed labor, kept down socialism, brought new capital into the country, and employed their people and operated their mines."

Senator Williams: "But suppose they had not had a tariff: Do you not imagine that the English and American people would have shipped goods into their market?"

Mr. Topping: "If they had not had a tariff—"

Senator Williams: "So that they could not have recouped on the home market?"

Mr. Topping: "They could not have had a syndicate operation had they had free trade, because they could not have maintained the level of home values."

Senator Williams: "That is just what I was thinking."

Mr. Topping: "That is exactly right."

Senator Williams: "That is what I wanted you to enlighten us upon."

Mr. Topping: "Further reference to this feature of competition is made in a market report of the Dusseldorf correspondent of the London *Iron and Coal Trades Review*, for March 20, 1908, which states that the home and export prices which prevailed in Germany, in that month, for leading articles of iron and steel, were,—

Articles.	Home price.	Export price.	Approx. Diff. U. S. equivalent.
Joists	122s 6d at 125s	109s at	$3.84
Blooms ..	92 6 at	74 at	4.44
Billets ...	100 0 at	76 at	5.76
Steel bars.	102 6 at	78 at 79s	5.52

"A difference of $5 a ton and over in steel bars would mean $5,000,000 a year to the Republic Iron & Steel Co., because we make about 1,000,000 tons per annum. Think of it—think what Germany is doing, the price she is paying, to increase her export trade and employ her labor; whereas if we sell a pound of stuff abroad, we are open to criticism and are likely to bear a badge of demerit rather than merit, if we do export by chance a few pounds of steel and iron from America."

Senator Williams: "You will not wear that badge because you export, will you? You wear is because you recoup it or make it up on the home consumer?"

Mr. Topping: "We cannot make it up on the home consumer under the Payne bill. Under the proposed bill, it would mean, in my opinion, so far as my own judgment goes as to what I would do—I will not go out of business like my friend Mr. Schwab,—

Senator Williams: "Of course if you could do it you would wear the badge, not because of what you exported, but because of what you recouped."

Badge of Dishonor

Mr. Topping: "We would have that badge placed on us by some as a badge of dishonor rather than one of honor. I think we would be entitled to the badge of honor, because any man that can pay 100 per cent more for his labor and still export is entitled to a badge of honor, in my opinion."

Senator Williams: "Not because of what you exported, but because of what you recouped at the expense of the home consumer. That would be the reason of putting the badge on you; would it not?"

Mr. Topping: "Our exports are not made as a result of recouping on the home consumer, because we are selling steel today cheaper than any other country on the face of the globe to the home consumer. That is what we are doing under the Payne bill. The average price on most of the products we produce—and we produce a very large line—would run from $2 to $3 a ton below English and German prices, f. o. b."

Senator Williams: "That is a rather important statement. Let me see if I caught it right. You say the American producers are selling steel today cheaper in the home market than any other producers in the world?"

Mr. Topping: "I think so; and the reason for it is that the American steel producer is selling steel at a loss today."

Senator Williams: "Oh! Did he sell cheaper last year?"

Mr. Topping: "This question of competition, that has worried some of our politicians and others, is here in very deadly earnest. It is a case of the survival of the fittest, and the fit are few in number, and many are going by the wayside.

Senator Williams: "If the home competition is so fierce that it has reduced you to prices below the level of prices anywhere else in the world for the same products, then how in the world would you be hurt by foreign competition?"

Mr. Topping: "Because we cannot continue to do business at a loss. You will have your iron mills out of business in a short time at this rate."

Senator Williams: "That is about what I thought."

Mr. Topping: "Do you want to bring about that condition?"

Senator Williams: "You say it is temporarily suffering a loss. How did your production last year, your prices, compare with those of this year? Will you make the same statement about last year that you made a moment ago about this year?"

Mr Topping: "I will answer that question by saying that—"

Senator Williams: "You said that you were selling cheaper than anyone else in any other home market."

Mr. Topping: "The answer to that question is contained in the annual report of my company, which shows that we earned about 7 per cent on our preferred capital last year."

Senator Williams: "No; you do not understand me."

Mr. Topping: "That answered your question. I think I understand you."

Senator Williams: "No; you made a statement a moment ago that just at the present time your prices to the home consumer were cheaper than the prices of any other country to home consumers."

Mr. Topping: "Any other producing country, of course—that is, Germany, England or France."

Senator Williams: "Of course—any other producing country. Now I ask you if that statement which you make about this year would apply to the year 1910?"

Mr. Topping: "I do not think the difference would be so marked last year as today, because foreign prices are abnormally high, they having advanced during the past six months very materially, and they have had two years of practically a boom in Europe. England and France and Belgium and Germany are receiving—"

Senator Williams: "That statement would not apply to the year 1910, then?"

Mr. Topping: "I do not think so."

Senator Williams: "Would it apply to the year 1909?"

Mr. Topping: "I think not."

Senator Williams: "1908?"

Mr. Topping: "I think not."

Senator Williams: "So it is a mere temporary situation?"

Mr. Topping: "I so regard it."

Momentary Depression

Senator Williams: "Growing out of a momentary depression of trade?"

Mr. Topping: "No; growing out of an unusual world's demand abroad, and the unusual depression existing here, due to the uncertainty that surrounds business efforts today. We do not know where we stand."

Senator Williams: "I say, it is a momentary depression here; is it?"

Mr. Topping: "I hope so, but I do not know whether it will be or not, unless some constructive legislation is worked out by you gentlemen."

Senator Williams: "At any rate, let us express it differently, and say it is a present depression here."

Mr. Topping: "A present depression is what it unquestionably is."

Senator Williams: "Very well; that is the way you account for it, notwithstanding the increased demand abroad, and the stimulated business there?"

Mr. Topping: "I think you may put it another way: That our condition here of so-called depression is brought about—that is, the reduced consumption is accounted for—more largely by the fact that the constructive uses of iron and steel have practically disappeared, because new enterprise lags in a time of uncertainty such as we are in today, where no man knows what legislation is going to do for him, and where no man knows what he can do under legislation that exists, with any certainty."

Senator Williams: "Is that because of the uncertainty of the trust laws?"

Mr. Topping: "Exactly, and uncertainty as to this tariff; uncertainty as to what stuff is going to cost the merchant next month or next year. The manufacturer who buys steel, who makes agricultural implements, if you please, plows or harrows or wagons or what not—is not going to lay in a stock of steel, as he usually does, for a year's requirements, as he must, and make up his wagons and his plows for farmers' use next year, if he has any prospect ahead of him that steel is going to be worth three or four dollars a ton less, possibly by a reduction in the tariff, or through an agitation of the tariff, which always affects the price."

Senator Williams: "It just goes back to the wicked Democrats, then; does it not?"

Mr. Topping: "Generally speaking, it does. (Laughter.) Here are just a few items of labor, which I have no objection to putting in the record, taken from the pay-roll which I have prepared from our company, showing how the poor iron worker and the poor mechanic—this 'white slavery' business that Mr. Brandeis talks about so much—are paid, how many hours they work, and all about it."

The Chairman: "I suggest that you comment on the statement now, and then have it inserted in the record."

Mr. Topping: "All right, sir; I am going to do that. I want to say this in connection with the 12-hour system, which I believe has never been touched on by anybody. I stated a while ago that I had been in the steel business about thirty years. I have been in it, in fact, somewhat longer than that. I entered as a very young man, about 18 years old. My first position was that of statistician and chief clerk to the general superintendent of our old works. I came in very close contact with labor. I had to do with tabulations of figures and costs, and carrying out tests in the manufacture of iron and steel, and I have been through almost every other position since then.

Established by Unions

"The 12-hour system was established by the unions, absolutely; and it is not an institution of the trusts. It is not an institution of the manufacturers. I well remember that we tried to put into effect a three-turn shift in our sheet mills and tin mills some years ago before it was finally adopted. The unions that were then in control objected to that plan, because it meant the introduction of more apprentices, more new factors in the union, and they perhaps could not control labor as well with that condition of apprenticeship increased as they could with the restricted number that they had under control. They also had restrictions on the output of sheets and tin plate. It is because of that tendency to dictate and to manage the business for the steel maker that manufacturers have opposed the closed shop, and have fought so hard for the open shop, rather than against the institution of

Not Continuous Labor

One of the most interesting and important features of Mr. Topping's statement was the explanation of the so-called 12-hour system. He explained that there is a misunderstanding on this subject, for it is not correct, as many suppose, that the men work continuously. They work intermittently. They work 12 hours in preference to working a less number of hours. The 12-hour system was established by unions absolutely, and it is not now an instrument of the so-called trusts or of the manufacturers. Many who are on duty 12 hours do not do more than six hours of actual work.

The senators were greatly interested in Mr. Topping's statement, and insisted that he amplify it.

unionism, or against the propriety of labor legislating as best it can for its own improvement and advancement. It is that question of the principle of management. So that the 12-hour system has been with us a great many years; and if we were to change the 12-hour system—we admit that we have it, but the men who work 12 hours do not work continuously. They work intermittently. They work 12 hours in preference to working a less number of hours, because if you reduce the hours of labor it would mean increased wages per hour, and our wages now are so high that we cannot stand any increase in wages. We will do well to maintain what we have; and we cannot maintain it, in my opinion, if we have any change in this schedule as proposed under the Underwood bill.

"Just a word that will be, perhaps, instructive and entertaining. In the case of one of our large plants, where we have 6,545 people, 240 work eight hours, 9 work nine hours, 2,352 work 10 hours, 465 work eleven hours, and 3,479 work 12 hours."

Senator Cullom: "They all take their own time?"

Mr. Topping: "Yes, sir. This table, which I will submit, will show the occupations of the men who work these longer numbers of hours, and it will indicate to those who understand the occupations about how intermittent the work is. Of course no man can work continuously 12 hours; but if he works an hour and rests an hour, he may work 12 hours with greater ease than a man who works hard and persistently, without any breaks, eight hours. I would rather work 12 hours, alternating shifts of half-hour heats, or hourly differences (as many of them do in blast furnaces), or half hour heats in some of the smaller heating furnaces, than to work persistently eight hours without a break. Would not you?"

Heyburn is Interested

Senator Williams: "I do not know. I never tried either."

Senator Heyburn: "That is an interesting proposition, and I wish you would particularize that some; because the impression has gone out that where the witnesses have testified to men or boys working 12 hours, it meant 12 continuous hours. I wish you would emphasize that a little, and apply it to the different classes of 12-hour labor."

Mr. Topping: "There are no employes that I know of in the steel business that work continuously 12 hours."

The Chairman: "Out of the 12 hours, how many hours would they probably work? Mr. Schwab said some of them only work an hour out of the twelve."

Mr. Topping: "I would say that it would be very conservative to say that many who work 12 hours would not work continuously over six."

Senator Heyburn: "Those are all full-grown men, are they?"

Mr. Topping: "Oh, yes. We cannot work the small chaps in the case of our heavy products."

Senator Heyburn: "There is an aggregation in session here in town whose hearts are rended over the long hours that people are said to work; and it would be opportune to explain what is meant by the designated number of hours in the various kinds of employment, if you know the facts."

Mr. Topping: "To get at that in a perfectly clean-cut way, it would be necessary to state specifically the exact conditions that affect each job in the case of the people who are working long-hour time."

Senator Heyburn: "It might be profitable to do so."

Mr. Topping: "Before I would care to do that in that specific manner, I should want to check up my recollection and confer with some of the men who are now immediately in charge of those practical works. I have been out of the practical work for 10 or 12 years; but what I have before me is a statement prepared by one of our superintendents, and which is authentic and will go in the records, and can be verified."

The Chairman: "You can state in a general way, I suppose, what it shows?"

Mr. Topping: "I have stated in a general way, senator. I think, taking the blast furnace man, he would not average six hours. Take the open-hearth man: I doubt if he would average any more than that, because during the period of casts, when they are making a melt in a blast furnace, those men sit down and smoke, and if you do not watch them, some of them take a drink. We watch that, however."

Senator Cullom: "How does the impression go out that such a man works 12 hours when he actually only works six?"

Mr. Topping: "Because he has to wait an interval of time for the materials charged into a blast furnace to be smelted before they can be tapped. For instance, the man who has charge of the work of charging the furnace—that is, putting the raw materials in the top of the furnace—after he has filled up that furnace for each group of men, they sit down and wait until the furnace melts down its charge, and it is tapped by the tappers below and taken away. As soon as that operation is complete, the chargers come back, alternating the charge again, and the melters below are waiting for the stuff to melt. So while one crew works, the other waits, and vice versa."

Senator Cullom: "The man is really on duty all the time?"

Mr. Topping: "He is on duty 12 hours, but he has to work only about half the time."

Senator Heyburn: "How long does it take to tap the furnace?"

Mr. Topping: "That depends somewhat upon the character of the materials you are working, and on the size of your furnace. I think there is an interval there of about two hours."

Senator McCumber: "His duties consist of six hours of labor and six hours of smoking?"

Mr. Topping: "Whatever he cares to do."

The Chairman: "Reading the newspapers, I suppose, and discussing political questions?"

Mr. Topping: "Yes; reading a 'Hunky' paper, as we call the Hungarian papers."

Senator Heyburn: "What percentage of those people are citizens of the United States—those Hungarians?"

Mr. Topping: "I cannot answer that question. I do not know."

Citizenship of Employes

Senator Heyburn: "Do you pay any attention at all to the citizenship of your employes?"

Mr. Topping: "We pay no attention to it. In the last few years, on account of the conditions of labor, we have been fairly well employed, even though not at remunerative prices. Labor has been so well employed abroad that the influx of new labor has been insufficient to meet the demand for labor here to a large extent. The consequence has been that there has been comparatively little idle labor as yet in this country. Take your immigration returns for last year: They show that the influx of labor is less than half what it was the year before, and the outgo has been 2 to 1."

Senator Heyburn: "I read a statement in the paper since yesterday's adjournment to the effect that there was a very large increase in the percentage of American citizens in your

class of work within the last year or two; that there was not so large a percentage of foreigners being employed. Is that true?"

Mr. Topping: "I think that is true so far as the skilled workers are concerned, senator; but it is not true, in my opinion, in respect to the commoner labor, the rougher element of labor that we employ."

Senator Heyburn: "They are getting broken in, are they, to the new country they have just reached, probably?"

Mr. Topping: "Yes; they are getting broken in, and in time they will be assimilated, and in turn their children will be the skilled workers. It is the raw material that we start with and put on the crudest jobs. The second generation become the finishers."

Senator Heyburn: "Some of the first learning the trade?"

Mr. Topping: "Yes. Just take an item of the wage-earning power of these different men. I will just report a few of them that might interest you. In the mines, the average rate of wage paid in a northern mine is $2.56 per day. That is up in the northwest. Machinists, $3.45 a day; blacksmiths, $3.65; pattern-makers, $4; carpenters, $2.95; pipe-fitters, $2.80; boiler-makers, $3.25 (I am giving the tops, now, of these different branches); bricklayers, $4.30; roll-turners, $3.80; molders, $3.30; riggers (the fellows we use about putting up derricks and doing various kinds of construction work about our mills), $2.50. That is a rather more intelligent class of common labor. Electricians, $3.45; motor and light inspectors, $3.60; line men, $2.65; crane men (the men running electric cranes), $3.65; switchboard men, $2.76; larry operators, $2.52. The larry operator is the man that sits in a cage and works an electric lever that moves the crane or moves the electric trolley that takes the coal down to the coke ovens to be coked, or takes the ore down to the charging ovens for the blast furnace, where it is moved up to the skip at the top."

Sitting Most of the Time

Senator McCumber: "How much does he receive?"

Mr. Topping: "He receives $2.52, sitting down most of the time. Millwrights, $3.45; water tenders, $2.52; firemen, $2.28; boiler cleaners, $3. These are scaled down from the top; there are some prices lower than that—the second men, you know. Blast furnace top helpers (the man I talked about working 12 hours), $2.35; keepers (the men at the bottom), $2.85; helpers, $2.35. That is the foreign labor. They work 12 hours so as to get the $2.35. If they worked eight hours, they would get less money, because we could not pay them any more per hour—we could not. Yet there is an effort being made by some people to put into effect for those fellows an eight-hour, a seven-hour or a 10-hour shift for a five and a half day week, and in many cases they are rebelling against it. The men themselves are opposing that innovation. Bessemer plant, $3.50 to $4.36. Converting mill—that is the blooming mill, where the steel is rolled, and the ingot is handled—from $3.08 to $5.57. In the finishing mills, farther along the line, the wages run from $2.99 to $6.82. Maintaining the gas holders, where we convert the coal into gas, which in turn is taken into the furnace for heating or fuel, from $1.70 for common labor that uses the shovel to push the coal into the hopper to the gas-maker tender at $2.87. About all he does is to stand around and watch the operation and see that the men do their work. In the open-hearth steel works, the melters make $10 a day, and work 12 hours; first helpers, $5.25. The cheapest labor in that department gets $2.50 a day. In the rolling mills, the wages run from $3 to $5.35—about the same as in the other mill. In the finishing department, the wages run from $2.85 to $6 a day; and so on through the list. And when we get into the more highly finished jobs, the rollers earn as high, as I state, as from $12 to $15 a day, some of them. That is all I have to submit, gentlemen."

Will Enlarge Pittsburgh Mines Experimental Station

The United States bureau of mines is arranging through Director Joseph A. Holmes of the bureau, for more room for its operations in Pittsburgh, and is selecting a suitable site for building on or near the old Arsenal property in the Lawrenceville district to be used for the laboratories and the clerical force of the bureau. The new buildings are to cost approximately $200,000. A bill for the appropriation of $50,000, to enable the immediate start on construction work, is before the house of representatives, and plans are being laid to provide the necessary ground, if it is not obtainable on the present government reservation in the city, by the city's purchase of sufficient ground for the use of the government for this purpose.

SHEET STEEL INDUSTRY

Would Suffer Severely from Reduction of the Tariff.

Manufacturers of sheet steel have submitted a brief in behalf of 27,000 employes engaged in the sheet steel industry, drawing annually $22,000,000 in wages, and in behalf of the large amount of capital invested. The manufacturers also speak for that vast army of workmen who lay the foundation for the sheet steel industry by their labor in taking the ore from the mines, putting it through the blast furnaces and making sheet bars from which sheet steel is made, who, for this labor, receive annually in wages about $11,000,000. The brief discusses the relation of the wage earners to the tariff. It states that English galvanized steel sheets today are selling at $2.42 per hundred pounds f. o. b. port No. 24 gage; American, $2.45, putting the English product into New York $2.52, less duty, and the American at $2.61. The sheet steel industry has reached its present proportion with the assistance of a protective duty, which is now 6-10 cents per pound for black sheets and 8-10 cents per pound for galvanized. Under the Wilson bill, the protection was 8-10 cents for black and 1 5-10 cents for galvanized, and under the Dingley bill the protective tariff was 8-10 cents for black and 1 cent for galvanized. The labor cost for No. 24-gage is given as $9.23 per ton in the United States and only $3.80 in England. The manufacturers state that any impartial observer will see that the situation in the sheet business today is one that cannot be trifled with and every protection that can be extended to it should be given. The petition is signed by the Allegheny Steel Co., Brackenridge, Pa.; American Rolling Mill Co., Middletown, O.; Canonsburg Steel & Iron Works, Canonsburg, Pa.; Canton Sheet Steel Co., Canton, O.; De Forest Sheet & Tin Plate Co. Niles, O.; Empire Iron & Steel Co., Niles, O.; La Belle Iron Works, Steubenville, O.; McCullough Iron Works, Wilmington, Del.; Massillon Rolling Mill Co., Massillon, O.; Parkersburg Iron & Steel Co., Parkersburg, W. Va.; Seneca Iron & Steel Co., Buffalo, N. Y.; Stark Rolling Mill Co., Canton, O.; Thomas Steel Co., Niles, O.; Whitaker-Glessner Co., Wheeling, W. Va.; Youngstown Sheet & Tube Co., Youngstown, O.

BRIEF PRESENTED

By Independent Tin Plate Makers to Underwood Committee.

A committee of independent tin plate manufacturers composed of W. U. Follansbee, of Follansbee Bros. Co.; E. T. Weir, of Phillips Sheet & Tin Plate Co.; E. R. Crawford, of the McKeesport Tin Plate Co., and Charles E. Pope, of the Pope Tin Plate Co., addressed a brief on Jan. 15, to Chairman Underwood of the ways and means committee of the house, protesting against excessive reduction in the tariff on tin plate, terne plate and taggers tin.

The brief points out that the present duty is 1.2c a pound, recommends a reduction of 16 2-3 per cent, or 0.2 per pound, suggesting that the new duty be 1c per pound. The number of independent manufacturers of tin plate, etc., is 15, with an aggregate capital of $12,000,000. The total number of mills is 157, with a capacity of 500,000 tons, or 10,000,000 boxes. These companies employ a total of 11,000 men, and the annual pay roll amounts to $7,500,000. The entire tin plate industry of this country now employs about 25,000 hands, and produces about 800,000 tons, or 16,000,000 boxes, valued at $52,000,000. The total labor cost, including transportation, involved is $27,750,000. In the last three years the production has increased 33 1-3 per cent, and at the same time, the cost to the consumer has been materially reduced. The brief says:

"The suggested new duty of 1c per pound is absolutely necessary to maintain the tin plate industry. This is required because of, (1) lower cost of foreign labor; (2) lower cost of foreign raw materials; (3) small capital in foreign investment; (4) freight cost from mills to consuming points."

The lower cost of foreign labor is shown by accurate comparison of the wages paid per gross ton in the United States and in Wales. The labor cost per gross ton in the United States is $22.95, compared with $12.73, a difference of $10.22 per ton of 2,240 pounds, or a difference of 45.6c per 100 pounds.

Lower cost of foreign raw material is normally shown to be $6 per 2,000 pounds of finished tin plate, or 30c per 100 pounds. However, because of exceptionally good conditions, together with much higher prices ruling abroad, at the present time the cost of raw material differs but little in the United States and Wales. It is only because of the reversal of normal conditions that it is at all possible at this time to suggest the reduction in duty proposed.

As to the smaller capital invested in the foreign plants, the brief recites that to produce 25,000 tons per annum requires a total capital investment in the United States of $1,000,000, and in Wales, $583,333, showing a difference in the greater investment in the United States of $416,667, which is equivalent to $1 per ton of output, or 5c per 100 pounds. The annual charges for plant up-keep in the United States reach $50,000, and in Wales, $25,000, the difference being equal to $1 per ton of output, or 5c per 100 pounds.

As to freight costs from mills to consuming points, the brief points out that fully two-thirds of the consumption of the United States is at or near the seaboard. This requires an average of 40 cents per 100 pounds to transport, while the freight from mills in Wales, located at seaports, to New York, equals 8 to 10 cents per 100 pounds. Through rates from Welsh ports to inland American points are proportionately much less. Accordingly the freight item is very important and may show as high as 60 cents per 100 pounds differential in favor of Wales. In recapitulation, the brief further says:

"The suggested new duty of 1c per pound, while preserving to the American industry a reasonable proportion of this growing trade, is by no means prohibitive; should show regularly a fair volume of revenue producing importation and insure a low price to the consumer. The establishment of the American tin plate industry under a reasonable tariff most emphatically has not increased the cost to the domestic consumer, but on the contrary has reduced the price. The marvelous growth in consumption of tin plate from about 300,000 tons in 1890 to 800,000 tons in 1911 has unquestionably been largely stimulated by the reduced prices following the competition of American mills."

To Buy Equipment

The Oregon Iron & Steel Co., Portland, Ore., advises that its buildings recently damaged by fire were the main foundry building, 72 x 180 feet, the machine and carpenter shop the engine house, coke storage shed etc. The company expects to begin rebuilding at once. The principal equipment required will be machinery for the machine and carpenter shop and electrical machinery.

TWENTIETH ANNIVERSARY

Of Founding of Tin Plate Plant Will be Celebrated.

Indianapolis, Feb. 19. — Elaborate plans are being made to celebrate the 20th anniversary of the opening of the first tin plate plant in Elwood, and the arrangements are being made by the Elwood Merchants' and Manufacturers' Association. Daniel G. Reid, founder of the plant, and officers of the tinplate company are expected to be present. It is the intention to make the event the greatest industrial celebration ever held in Elwood.

With an authorized capitalization of $1,000,000 the General Industrial & Mfg. Co. has been organized here to manufacture a line of light motor delivery wagons and to conduct experiments for inventors. The company has leased the Industrial building, with 460,000 square feet of space. T. B. Laycock, secretary-treasurer of the T. B. Laycock Mfg. Co., is president and J. F. Lindley, sales manager of the Laycock company, is secretary of the new concern.

It is announced that the Anderson Tool Co., of Anderson, will locate in Hamilton, O., at once. The company's Anderson factory was destroyed by fire Jan. 25, and as it was necessary to obtain a new plant at once, and none was available in Anderson, it was decided to go to Hamilton.

A line of gasoline motors will be manufactured by the newly organized N. S. W. Motors Co., in this city, which has been incorporated with an authorized capitalization of $60,000. Those interested in the company are Charles Nesom, 529 Willard street; Louis Sagalowsky, 601 Fletcher avenue, and F. W. Wellman, 1229 Union street.

A company to manufacture brass valves and other brass specialties has been organized at Hammond, under the name of the Hammond Brass Works, and has been incorporated with a capitalization of $35,000. The incorporators are C. H. Mayer, J. E. Brennan, William Wolter, J. F. Lammering and F. S. Carter.

Pig, Lead and Spelter

Receipts and shipments of pig lead and spelter at St. Louis for the last two weeks were as follows:

	Slabs of zinc.	Pigs of lead.
Receipts		
For week ending Feb. 10..	93,780	48,970
For week ending Feb. 17..	118,900	33,110
Shipments:		
For week ending Feb. 10..	103,020	31,670
For week ending Feb. 17..	119,350	22,311

F. H. STILLMAN DIES

Machinery Builder Succumbs Unexpectedly in Brooklyn on Feb. 18.

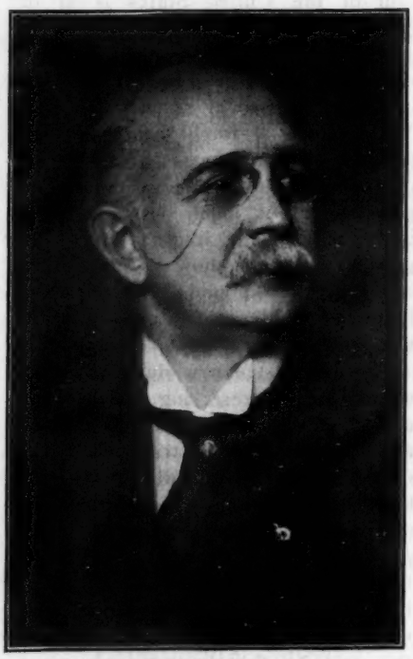
Francis H. Stillman, president of the Watson-Stillman Co., and the Bridgeport Motor Co., and also the first president of the National Metal Trades Association, died unexpectedly in Brooklyn on Sunday, Feb. 18. He was a builder of hydraulic machinery.

Born in 1850, Mr. Stillman was a son of Paul Stillman, who, with two brothers, comprised the principal mechanical engineers of the old Novelty Works, which, at that time, represented the chief machine shop of New York. He received his public school education at Mystic Bridge, Conn., completing the high school course, and, having removed to Wisconsin, entered Milton college, near Beloit. After that his technical training began. Apprenticed in the shop of the Cottrell & Babcock Printing Press Works, at Westerly, R. I., he entered preparatory classes in the Cooper Union, going from there to the Sheffield scientific school of Yale university, from which he was graduated in 1874.

It was some time previous to this that the first patent for a hydraulic jack had been taken out by Richard Dudgeon. Associated with him was E. Lyon, stepfather of Mr. Stillman. In 1880 the firm of E. Lyon & Co. was formed, which, aside from Mr. Lyon, was composed of T. H. Watson and F. H. Stillman. Following the death of Mr. Lyon, the firm of Watson & Stillman was organized and the business of manufacturing hydraulic jacks, presses and other hydraulic machinery was conducted at 470 Grand street, New York City, until the capacity of the shop was outgrown. Then the engine shop of William Munzer, on Forty-third street, was purchased and the business transferred to the new location in 1888. Continued expansion of the business made these quarters too small and about four years ago the business was incorporated as the Watson-Stillman Co., and the plant moved to Aldene, N. J.

Mr. Stillman was treasurer of the National Association of Manufacturers', former president of the Machinery club, of New York, a member of the American Society of Mechanical Engineers, being at one time chairman of its membership and finance committees, member of the Society of Naval Architects and Marine Engineers and of the Engineers' club.

Walter A. Post, president of the Newport News Ship Building & Dry Dock Co., and of the Dominion Land Co., died suddenly at his home in Newport News, Va., Feb. 12. Mr. Post was born at Kingston, N. Y., Jan. 7, 1857. As a young man he engaged in the engineering profession and his first work of importance in this direction was with I. E. White, contractor for terminal improvements on the Chesapeake & Ohio railroad, at Newport News. In 1890 he went with the Newport News Ship Building & Dry Dock Co. as a civil enginer, and he supervised the erection of the present plant of that company. He was elected president of the company in



FRANCIS H. STILLMAN

February, 1911. Mr. Post was a member of the Engineers' and Railroad clubs of New York, and of the Virginia Club, of Norfolk. He was a member of the American Society of Civil Engineers, the Society of Naval Engineers and the Society of Naval Architects. He had been a fellow of the Royal Astronomical Society of London, Eng., since 1883, and a member of the Astronomical Society of the Pacific.

Death came to Hamilton T. Beggs, president of the Beggs Pipe & Foundry Co., Birmingham, Ala., last Friday night at the home of his daughter in that city. Born in 1830 in Liverpool, Eng., Mr. Beggs engaged in the foundry business in Chattanooga, Tenn., before the civil war and is said to have cast the first gun made in Tennessee for the Confederate army and also the first bomb shell. He was later identified with the Shelby Iron Works, Shelby county, Ala., and at this place built munitions of war for the Confederacy. The first foundry and machine shops erected in Birmingham were owned and operated by Mr. Beggs in 1872.

A nervous breakdown suffered six months ago resulted in the death on Feb. 15 of William N. Epping, aged 43, at Pittsburgh. He was vice president and general manager of the Epping-Carpenter Co., of that city, hydraulic machinery manufacturers.

Wheeling Steel and Iron Makes Annual Report

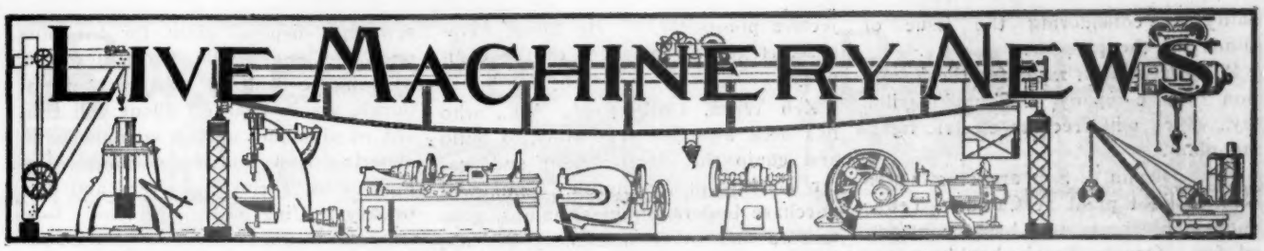
The recent annual report of the Wheeling Steel & Iron Co., Wheeling, W. Va., showed that net earnings were over $350,000, dividends $449,000 and surplus $2,378,000, an increase of $153,000 over that of 1910. The total indebtedness aside from bonds was $2,400, and the cash in banks $138,000. Bonded indebtedness was reduced $30,000. The old board of directors holds over for another year as no quorum was present at the annual meeting of stockholders.

Brier Hill Steel Co. Sells Pig Iron

In some way, the impression has been made in several places that the Brier Hill Steel Co., Youngstown, O., which recently took over the organizations of the Empire Iron & Steel Co., the Thomas Steel Co., the Youngstown Steel Co. and the Brier Hill Iron & Coal Co., is not in the pig iron business. This report is erroneous, as the Brier Hill Steel Co. has a pig iron department and has large stocks of Bessemer, basic and malleable pig iron, both sand and chill cast, ready for immediate shipment.

Build at Grand Rapids

Plans are being made by P. M. Wege, Marietta, O., and several associates, to establish a metal furniture factory in Grand Rapids, Mich. The buildings, whose construction is expected to be started within 30 days, will be located on a two and a half acre tract. Mr. Wege was formerly superintendent of the General Fireproofing Co., Youngstown, O.



In New York, several of the principal railroads, including the New York Central, the New York, New Haven & Hartford and the Pennsylvania, have closed for fair lots of machine tools the past week and it is believed that action will also be taken by the Delaware & Hudson this month on the list of machine tools which it recently submitted. Recent developments also make it appear probable that the New York Central will ask for revised bids on the list of specifications submitted about a year ago. There is a comparatively large demand for second-hand machine tools in New York. In Pittsburgh, conditions are reported as having perceptibly improved, this being due mainly to a heavier volume of inquiry and not to any increase in the volume of sales. In Cleveland, a considerable quantity of new construction is projected, but the majority of this has been held up and the demand for machinery from this source is dormant. A Cleveland manufacturer has just entered that market for several thousand dollars worth of machine tools. In Chicago, conditions are quiet, the demand for power plant machinery being the most prominent feature.

New Construction

The Canadian General Electric Co., Toronto, will erect a three-story factory on Dufferin street, to cost $87,000.

The Southern Pacific railroad, Tucson, Ariz., plans to rebuild its machine shops there. The work is estimated to cost $300,000.

The United States Pressed Steel Co., Ypsilanti, Mich., manufacturing steel whiffletrees, is erecting an additional building and installing new presses.

The Goldie & McCulloch Co., Galt, Ont., will this season spend $80,000 increasing the plant of its machinery works and will build a large addition to their boiler shop.

Brass welding and other equipment is being installed in the shop of the Polytechnic Co., 289 Poplar street, Memphis, Tenn., which was recently organized.

Manufacturing operations are to be begun in the immediate future by the Kentucky Check Row Corn Planter Co., Bowling Green, Ky., which was recently incorporated.

The Kanawha Mine Car Co. has awarded a contract for four new buildings at its plant at Charleston, W. Va. They will include machine shop, 60 x 110 feet, a blacksmith shop, 55 x 58 feet, and two wings to the foundry.

The California Art Steel Ceiling Co., Los Angeles, Cal., will soon commence the erection of its proposed plant for the manufacture of its specialties, on Santa Fe avenue, Los Angeles.

Work is being pushed on the new buildings of the Eureka Foundry Co., Chattanooga, Tenn., the plant of which was recently burned. The concern will spend about $25,000 in building and equipping its new plant.

The Eureka Foundry Co., Chattanooga, Tenn., whose plant was recently damaged to the extent of about $30,000 by fire, has decided to replace the burned portion with a brick structure.

Anton Burchard, Cuyahoga building, Cleveland, is taking bids for 60 oil-burning furnaces to be installed in the forge shop of the new plant of the Peck, Stowe & Wilcox Co., at Southington, Conn.

The Ajax Metal Co., 46 Richmond street, Philadelphia, has purchased a tract of 28 acres of ground at Orthodox street and Delaware river and is planning the erection of a number of factory buildings upon the site.

The General Electric Co. of Pennsylvania has awarded the contract for the construction of another foundry building at the Erie, Pa., plant. The Riter-Conley Mfg. Co. received the general contract, which will require about 875 tons of material.

It is announced that the Cataract Rubber Co., 320 White building, Buffalo, will build a three-story, reinforced concrete factory in that city. Plans have been prepared by H. L. Brickell, architect, 384 Breckenridge street, Buffalo.

The International Hoist Co., of Antigo, Wis., which absorbed the Pioneer Iron Works, gasoline engines, motors, etc., has decided to sell the remainder of its stock in treasury, $20,000, for the purpose of building a new plant. The capitalization is $50,000.

The Ellicott Machine Co. has awarded the Chesapeake Iron Works the contract to erect a supplementary plant at the old quarantine property, Baltimore, recently acquired. The auxiliary plant will comprise three structural iron buildings, one story high. The workshop will be 50 x 150 feet, the power plant 50 x 50 feet, and the office 50 x 50 feet.

The Transue & Williams Co., Alliance, O., [illegible] that its plant was only p[illegible]ly destroyed by fire and is being rebuilt with slight changes. The company is not able to give any information as to its rebuilding plans insofar as they relate to the dimensions or character of buildings or equipment.

Plans for the erection of two manufacturing buildings, to be erected at Pittsfield, Mass., are being considered by the General Electric Co. A storehouse and machine shop, 125 x 375 feet, to be erected on Tyler street, at a cost of $100,000, and a building to be erected on Woodlawn avenue at a cost of $150,000 are included in the company's plans.

Power Plant Equipment

Duluth, Minn., has voted bonds to the amount of $750,000 for the construction of an electric lighting plant.

The Muddy Valley Irrigation Co., Las Vegas, Nev., plans the erection of two electric power plants.

Plans are being prepared for the construction of a heating and lighting plant at the Isolated hospital, Milwaukee. Estimated cost is $25,000.

The Battle Island Co., Knowlton, Wis., is planning to erect a hydroelectric plant to develop about 2,300 horsepower.

Property owners at Conneaut Lake, Pa., are forming a company with the idea of building a local electric light and power plant.

Plans have been drawn for a municipal electric lighting plant to be erected by the city of Vinton, Ia., at a cost of about $20,000.

An electric light plant may be erected at Lynnville, Tenn. The munici-

pality is considering the issue of bonds for the purpose.

Plans have been made for the formation of a company at Tompkinsville, Ky., which will erect an electric lighting plant.

J. C. Durdin & Son are erecting an electric light plant at Camden, Tenn., and machinery is now being contracted for. Orville Travis has been appointed superintendent.

The board of improvements, Clarksville, Ark., will receive bids until March 1, for the construction of a 200-horsepower electric lighting plant. T. E. May is chairman.

Osceola, Ark., will open bids about March 10, for the construction of an electric lighting plant. W. N. Gladstone, Fayetteville, Ark., is consulting engineer.

The city of Meigs, Ga., E. E. Wilkes, mayor, will open bids about April 1, for the construction of an electric lighting plant of 200 to 300-horsepower capacity.

James Davis and R. L. Russell are interested in the erection of a hydro-electric plant on Robinson creek, near Campbellsville, Ky. Surveys are now being made, and if they result favorably work will be begun at once.

The authorities of Norwich, Conn. are considering the installation of a 2,000-kilowatt, turbo-generator unit, at the municipal plant. It is estimated that the improvement will cost about $37,000.

A two-story addition to the power plant of the Minetto-Meriden Co., Minetto, N. Y., has been decided on The company has engaged A. S Coffin, architect, 109 Rand street, Chicago, to prepare plans.

The Bowling Green Gaslight Co. Bowling Green, Ky., is making improvements in its plant, involving the installation of new machinery. The company recently let a contract for a 500-horsepower, high-pressure boiler, and other equipment will be added.

The Scranton Electric Co., Scranton, Pa., will install a 7,500-kilowatt, 60-cycle, 4,000-volt generator; two 2,000-kilowatt, alternating-current, synchronous motors, and a 750-kilowatt, direct-current balancer set. D. T. Campbell is manager.

Pulaski, Tenn., the electric light plant at which place recently burned, is planning the immediate rebuilding of same and will require engines, generators and other equipment. A $20,000 bond issue is being arranged to provide for the work.

Plans for constructing four substations are being considered by the Syracuse Lighting Co., Syracuse, N. Y. Marcellus, Marcellus Falls, Skaneateles, and Skaneateles Junction are the objective points. J. C. De Long, Syracuse, is general manager of the company.

Zeb Ward, Little Rock, Ark., who has been awarded a contract to build and equip the electric light and water systems of Lexington, Tenn., will purchase boilers, engines, pumps, generators and other machinery for use in the work. The total amount involved is about $50,000.

The city commissioners of Saskatoon, Sask., will receive tenders up to March 8 for electrical machinery, including five 500-horsepower water tube boilers, five sets of automatic stokers, with induced draft plant and duplicate fans, economizers for 2,000-horsepower capacity, two feed pumps, one 2,000-kilowatt high-pressure steam turbine with condenser air pumps and equipment, two 75-kilowatt turbine exciter, one generator panel and two exciter panels with necessary cables and apparatus.

Miscellaneous

The fiscal court of Bourbon county, Paris, Ky., is to purchase a considerable amount of road-making equipment, and bids will be received by a committee composed of Magistrates E. P. Thomason and J. J. Redmon.

A coal washing plant and other machinery for coal mining will be installed by the Edgewood Consolidated Coal Co., Middlesboro, Ky. Edward J. Douglas is manager of the company.

The National Roll & Foundry Co., Avonmore, Pa., has received a contract from the Follansbee Bros. Co., for an additional cold mill to be installed complete in its tin plate works at Follansbee, Pa.

The American Zinc Co., of Tennessee, which has been operating a plant at Mascot, Tenn., intends to make extensive improvements, it is reported, and will install a mill with an initial capacity of 1,000 tons a day, this to be enlarged later.

C. S. Weisse & Co., Sheboygan Falls, Wis., tannery and electric light and power operators, have contracted with the H. P. Chuse Engine Co., Mattoon, Ill., for a 225-horsepower Chuse engine, which will be direct connected to a 150-kilowatt "Northern" generator.

A system of electric haulage is to be installed in the mines of the Kentucky Midland Coal Co., located near Central City, Ky. Other improvements will be made, including the use of machine coal cutters. The capacity of the mines is to be increased from 500 to 2,000 tons a day.

Plans have been completed for a sewerage disposal plant for the borough of Connellsville, Pa. Chester & Fleming, consulting engineers, Pittsburgh, are in charge. Plant will consist of plumbing station equipped with electric-driven centrifugal pumps, Imhoff tanks, sprinkling filters and secondary settling basins.

Government News

Bids were opened Feb. 13, by the bureau of supplies and accounts, navy department, for furnishing materials and supplies to be delivered at various naval stations, in accordance with the schedules and classes enumerated, as follows:

Schedule 4251, class 22, Mare Island, one steam capstan, for U. S. S. Jupiter: American Engineering Co., Philadelphia, $990; Hyde Windlass Co., Bethlehem, Me., $620.

Class 23, do., one combined steam and hand steering engine, screw-gear type, for U. S. S. Jupiter: American Engineering Co., Philadelphia, $4,660; Hyde Windlass Co., Bethlehem, $3,881; Lidgerwood Mfg. Co., New York, $5,074.16 and $4,972.

Schedule 4262, class 31, Brooklyn, Gyro indicator system, 125 volts. Chas. Corey & Son, New York, $14,754 and $18,779; Manhattan Supply Co., New York, no total; Sub-Target Gun Co., Boston, $9,894.95.

Schedule 4263, class 32, Norfolk, Va., one gate shear, with 26-inch throat depth of housings: Bethlehem Steel Co., South Bethlehem, Pa., $8,566; Cleveland Punch & Shear Works Co., Cleveland, $4,600; Frevert Mchy. Co., New York, $4,950; Hilles & Jones Co., Williamsport, Del., $4,068; Niles-Bement-Pond Co., New York, $5,000; Wickes Bros., Saginaw, Mich., $5,989.

Schedule 4263, class 33, Norfolk, Va., one six-power hydraulic riveter: Bethlehem Steel Co., South Bethlehem, Pa., $4,100; Camden Iron Works, Camden, N. J., $2,205; F. H. Lovell & Co., Arlington, N. J., $3,328; Wm. H. Wood, Media, Pa., $3,753.

Class 34, do., one motor-driven tube cutting-off machine: Kemp Machinery Co., Baltimore, $415; Manning, Maxwell & Moore, New York, $446, $396, $688 and $638; Niles-Bement-Pond Co., $800.

Schedule 4285, class 41, Philadelphia, two geared pneumatic hoists, 5-ton, 4-strand, each complete with one plain trolley: Chicago Pneumatic Tool Co., New York, $513; Detroit Hoisting & Machinery Co., Detroit, $270 and $250; Ingersoll-Rand Co., New York, $266; South Norwalk Engineering Co., South Norwalk, Conn., $269.

Class 42, do., one blacksmith's drill press: Fairbanks Co., Washington, $135.92 and $148.77; Manning, Maxwell & Moore, New York, $144.

Schedule 4288, class 58, Brooklyn, 120 pneumatic scaling hammers: Independent Pneumatic Tool Co., Chicago, $25; Ingersoll-Rand Co., New York, $18; Monarch Pneumatic Tool Co., St. Louis, $19; Geo. Oldham & Sons Co., Philadelphia, $25; Wm. A. Pate, Washington, $15 and $17; Pittsburgh Pneumatic Co., Canton, O., $13.

Class 59, do., 130 pneumatic hammers, miscellaneous: Independent Pneumatic Tool Co., Chicago, $3,955; Ingersoll-Rand Co., New York, $3,355; Monarch Pneumatic Tool Co., St. Louis, no total; Geo. Oldham & Sons Co., Philadelphia, $4,300; Wm. A. Pate, Washington, $2,800; Pittsburgh Pneumatic Co., Canton, O., $2,940.

Class 60, do., 4 bottom riveters, and 8 jam riveters. Wm. A. Pate, Washington, $1,675.

Class 62, do., 135 non-reversible pneumatic drilling machines: Independent Pneumatic Tool Co., Chicago, $5,637.50; Ingersoll-Rand Co., New York, $7,200; Wm. A. Pate, Washington, $5,800.

Class 63, do., 4 reversible pneumatic drilling machines: Independent Pneumatic Tool Co., Chicago, $230; Ingersoll-Rand Co., New York, $300; Monarch Pneumatic Co., St. Louis, no total pt.; Wm. A. Pate, Washington, $250.

Class 64, do., 26 pneumatic drilling machines, corner: Independent Pneumatic Tool Co., Chicago, $1,625; Ingersoll-Rand Co., New York, $2,340; Monarch Pneumatic Co., St. Louis, $2,370; Wm. A. Pate, Washington, $1,720.

New Buyers

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

The following manufacturing companies have filed articles of incorporation:

The Automobile Forgings Co., Detroit; $160,000; by Geo. W. Strelinger, David E. Van Derver and others.

Nehring Insulated Wire & Mfg Co., Sycamore, Ill.; $30,000; by Paul A. Nehring, James W. Cliffe, Thomas M. Cliffe and Louis E. Peck.

Universal Motor Truck Traction Co., St. Louis; $250,000; by William H. Taylor, John Beltram, A. R. Shaffer.

Hammond Brass Works, Hammond Ind.; $35,000; to manufacture brass valves and other specialties; by C. H. Mayer, J. E. Brennan, William Wolter, J. E. Lammering and F. S. Carter.

Vixen Tool Co., Camden, N. J.; $2,000; to manufacture steel, iron, copper, etc.; by F. R. Hansell, George H. B. Martin, John A. MacPeak, all of 419 Market street, Camden.

Superior Register Co., Canisteo, N. Y.; $500,000; to manufacture cash registering apparatus, etc.; by John P. Langs, Morris Cohen Jr., Frederick Chormann, Niagara Falls, N. Y.

Curtiss Motor Co., Hammondsport, N. Y.; $600,000; to manufacture motors, engines, motor cycles, vehicles; by Monroe Wheeler, Bath, N. Y.; G. Ray Hall, Hammondsport, N. Y.

The Northern Bolt & Screw Co., Ltd., Owen Sound, Ont.; $200,000; by provisional directors, Horace B. Smith, Francis H. Kilbourn, James Garvie and others.

Provincial Motors, Ltd., Toronto, Ont.; $70,000; to manufacture motors, etc.; by provisional directors, Arthur L. McGovern, James M. Donahue, H. T. Hunter and others.

The Krebs Commercial Car Co., Clyde, O.; $100,000; to manufacture motor trucks, automobiles, gas engines; by B. A. Becker, J. C. L. Krebs, Frank K. Bachie, Homer Metzgar, Geo. S. Lessman.

Factory Service Co., Ltd., Toronto, Ont.; $40,000; to carry on business as machinists, electrical engineers, etc.; by provisional directors, Thos. C. Davis, Frank J. Hughes and Mary H. Robertson.

National Rolling Mill Co. of Cuba, Manhattan, New York City; $250,000; to manufacture and deal in iron and steel, etc.; by Lester S. Bachrach, Norbert B. Kates, 17 State street, New York City; John C. Brown.

Rudolph Liebmann Mfg. Co., Newark, N. J.; $100,000; to manufacture metal goods; by Rudolph Liebmann, Geo. G. Liebmann, Arthur R. Liebmann, New York City; Ernest F. Keer, Newark.

Forsyth Metal Goods Co., Buffalo; $30,000; to manufacture metal goods, tools, etc.; by John H. Price, Akron, N. Y.; Herbert B. Rose, 413 Massachusetts avenue; David N. Whittington, 51 Gallatin avenue, Buffalo.

Sherman-Lucas-Smith Co., Chattanooga, Tenn.; $100,000; to manufacture transmission machinery; by Morris Sherman, James Lucas, Thomas L. Smith, D. F. Beckham and C. E. Khoom.

The Iron County Steel Co., Iron River, Mich.; $1,000,000; to mine iron ore and to manufacture; by Isaac W. Byers, Ellsworth S. Coe, Finley A. Morrison, Wm. H. Seldon Sr., Earl Van Ornum and Edward M. D. Libby, all of Iron River, Mich.

Guthrie-Mitchell Co., Little Rock, Ark.; $200,000; to manufacture malleable iron and steel and patented insulator; by president, W. M. Mitchell; vice president, A. C. Lockley; treasurer, Sol H. Johl; secretary, Joe A. Guthrie.

Southwestern Power Co., Manhattan, New York City; $100,000; to construct dams, power plants, etc.; by William D. Johnson, Hartford, Conn.; Frederick W. Kristeller, 100 William street; Frederick W. Livingston, 119 West Forty-ninth street, New York City.

The Walsh & Nelson Mfg. Co., Brooklyn, N. Y.; $10,000; to manufacture and deal in machinery, tools, dies, etc.; by David Nelson, 1352 Fifty-fifth street, Brooklyn, N. Y.; Owen Walsh, 271 Broadway, New York City; John T. Booth, 271 Broadway, New York City.

Everybody's Packing Co., New York City; $10,000, to manufacture packing for machinery, engine room supplies; by Julius Schroeter, Bourse building, Philadelphia; Carl W. Schroeter, 16 Glenwood avenue, Leonia, N. J.; Albert H. Berrwirth, 2068 Arthur avenue, Bronx.

Fow Mfg. Co., Philadelphia; $15,000; buying, selling, manufacturing or dealing in tin, lead, copper, zinc and other metals and asbestos articles; by Benjamin Fow, 2514 South Beulah street; Nathan Fow, 2522 South Sheridan street; Harry Fow, 1932 Stanley street; Frederick Fluck, 2303 South Twelfth street, all of Philadelphia.

General Industrial

The American Machine & Mfg. Co., Charlotte, N. C., has increased its capital stock to $350,000.

The Kenova Casting Co., Kenova, W. Va., recently organized, will establish a foundry at that place.

Retiring directors of the Niles-Bement-Pond Co. have been re-elected by the stockholders.

A receiver has been appointed for the Practical Heater Co., Monroe, Mich., and the corporation will be dissolved.

The Trenkamp Stove & Mfg. Co., Cleveland, has increased its capital stock from $75,000 to $150,000.

The Maryland Steel Co., Sparrow's Point, Md., advises respecting a recent fire that as yet it has not authorized rebuilding the pattern storage structure recently destroyed by fire.

The sale of the Platt Iron Works, Dayton, O., will take place on March 7, according to an agreement reached by creditors. The appraised value of the works is $1,400,000.

Stockholders of the Chicago Railway Equipment Co., Chicago, recently re-elected the former directors, who at a subsequent meeting re-elected the officers.

Directors of the Empire Foundry & Harvester Works, Marysville, Cal., at a recent meeting decided to dispose of the machine shop and retire from business. The foundry was ordered closed several days previously.

Fred Vollmar, of Marshfield, Wis., receiver of the defunct Vesper Safety Clevis & Malleable Iron Co., of Vesper, Wis., has issued a schedule of the foundry assets, which will be sold at public auction at Vesper, on March 28. The property represents an in-

vestment of approximately $30,000, since 1907.

The International Portland Cement Co., Spokane, Wash., will build a new cement plant at Trent, Wash. The plant is estimated to cost $1,000,000.

The city of Sacramento, Cal., plans to make extensive improvements and additions in its water system. The work is estimated to cost $85,000.

The Dominguez Water Co., Dominguez, Cal., plans the installation of a modern water system in Dominguez. The expenditure will be $500,000.

The Nicholson Coal Co., Middlesboro, Ky., has increased its capital stock from $60,000 to $120,000 and will spend $15,000 in the installation of a coal washing plant and other equipment.

Murray, Ky., is now marketing a bond issue of $23,000, and as soon as it is realized upon plans will be drawn and contracts let for the erection of a water system.

The Wendling-Johnson Lumber Co., San Francisco, Cal., plans the erection of a lumbering plant at Eugene, Ore. Estimated cost, $1,000,000. H. S. Lawrence represents the company.

The Holly Sugar Co., Huntington Beach, Cal., announces its intention of installing a Steffens system in its manufacturing plant. The improvement is estimated to cost $100,000.

The De Laval Steam Turbine Co., Trenton, N. J., is completing a 1,250-horsepower turbo-generator for installation at the power house of the Trenton & Mercer County Traction Co.

The Louisville Brick Co., Louisville, Ky., will double its capacity, increasing its daily output to 100,000 brick. Steam dryers, presses and other machinery will be needed. Joseph Nevin is general manager of the company.

Lexington, Ky., will install a rock-crushing outfit at the city workhouse. Bids will be taken for the equipment by the jail committee of the general council, which expects to spend about $6,000 for the machinery.

The Simmons Hardware Co., St. Louis, has taken a lease for a long period of years upon buildings at Arch, Cherry and Appletree streets, Philadelphia, formerly occupied by the Curtis Publishing Co.

The American Steel Belt Co., Pontiac, Mich., which recently increased its capitalization to $100,000, will shortly remove to Detroit, having secured a factory at Hubbard and C streets.

The J. S. Rowell Mfg. Co., of Beaver Dam, Wis., agricultural implements, etc., has increased its capital stock from $100,000 to $300,000. Part of the new issue will be used in extending the works.

J. B. Wise, Inc., Watertown, N. Y., whose incorporation was recently noted, advises that he has incorporated to conserve his interests and protect his estate. He manufactures furnace machinery and plumbing supplies.

A charter has been asked by Agnes Sommerville, W. G. A. Miller and Howard Zacharias, of Pittsburgh, for the incorporation of the Sommerville Iron & Bronze Works, Inc., for manufacturing, buying and selling, constructing and erecting iron and steel and ornamental iron, bronze and brass.

E. C. Hazard has disposed of his interest in the firm of Hazard, Coates & Bennett Co., Rochester, Md., dealers in iron and steel scrap, railway materials and supplies. The company advises that it will continue its methods of carrying on business, no change being effected by Mr. Hazard's leaving the firm.

Construction of its proposed rolling mill, reheating furnaces and open hearth furnace will be done by the Morgan Construction Co., Worcester, Mass., for the Atlanta Steel Co., Atlanta, Ga. Foundation and brick work will be done by the steel company under the direction of President Thomas K. Gleen.

August W. Dodge, who has been manufacturing boilers at Springfield, Mass., for the past 15 years or more, and who brought out the Dodge boiler four years ago, has merged his business with that of the Westfield Foundry & Valve Co., Westfield, Mass. The latter concern will consequently increase its capacity and will be pleased to receive catalogs from manufacturers of machinery in its line.

The Portage Silica Co., Youngstown, O., at its recent annual meeting elected the following directors: J. G. Butler Jr., J. B. Chambers, H. H. Hoffmaster, Henry A. Butler, E. E. Klooz and H. Z. Kelly. The directors elected the following officers: President, J. G. Butler Jr.; vice presidents, J. B. Chambers and H. H. Hoffmaster; secretary, E. E. Klooz; treasurer, H. Z. Kelly. Mr. Klooz is general manager and Mr. Kelly is sales manager. The company recently signed a contract with the National Malleable Castings Co. for its requirements of steel molding sand at the Sharon, Pa., works, for 1912. The minimum tonnage is 30,000 tons, or 150 tons for each of the 200 days considered a season. The National Malleable Co. will undoubtedly require from 40,000 to 50,000 tons. The contract was awarded only after the Portage sand had given exceedingly satisfactory results.

Demand for shallow river steel boats is reported by James A. Reese & Sons Co., Pittsburgh, to be greater than at any time in the past, more business being booked since last July than in 12 years prior to that date. The company has just received an order for three light draught river steam boats and six galvanized steel barges with flat bows, all to be delivered July 1. The company is working upon another order which calls for the construction of a light draught river gun boat carrying seven guns of small caliber and to be used as a ram in offensive work by a small South American republic.

Trade Notes

J. J. Tierney announces the removal of his coke offices from Elkton, W. Va., to the Kelly & Moyer building, Bluefield, W. Va., on Feb. 12.

A. Leschen & Sons Rope Co., St. Louis, has recently issued the first number of a house-organ entitled Leschen's Hercules. The first issue contains a description of the Roosevelt dam, showing the use of wire rope cableways in the construction of this dam, together with other information of interest to wire rope users.

The Triumph Electric & Ice Machine Co., Oakley, Cincinnati, is publishing a new house organ under title of "The Triumph Chronicle," the first number having appeared Feb. 1. It is devoted to the various products of the plant and contains office and field notes as well as general information regarding the trade.

The H. W. Johns-Manville Co., well known in the lighting field as manufacturer of the "Linolite" system of illumination, announces that it has acquired the sole selling agency for the entire line of reflectors and lighting fixtures developed and manufactured by I. P. Frink during the past 50 years. The Johns-Manville company will maintain an engineering department throughout the United States and Canada and will thus be prepared to design and equip illuminating systems for all kinds of service.

Fires

A loss estimated at $10,000 was sustained to the stock and machinery of the Columbus Auto Brass Co., Columbus, O., on the night of Feb. 13.

The Allith-Prouty Co., Albion, Mich., manufacturing door hangers and hardware specialties, lost its nickel plating department by fire, Feb. 2. The loss was about $1,500.

The factory of the Owen Sound Wire Fence Co., Owen Sound, Ont., was badly damaged Feb. 10, entailing a loss of about $20,000, on which there is an insurance of about $28,000.